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Anatomical Essay,

I N T W O

R

DISCOURSES,

I. Pointing at many things Curious, and Remarkable in the Structure of the *Viscera*, with which are intermixt, some plain Reflections, Subversive of *Atheism*.

II. An Anatomical Explication, of the first six Verses of the Twelfth Chapter of *Ecclesiastes*; being more agreeable to the Modern Anatomy than any heretofore published.

EDINBURGH,

Printed in the Year, 1702.

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THE

PREFACE

TO THE

READER.

I Doubt not, but that I shall incur the Censure of those that relish nothing that favours of Religion, yea to such the very design and scope of this Treatise, will be Argument enough to state them Enemies; But to these Gentlemen, I have to say that I write this with a Design not to offend them; but to defend myself, and me thinks Self-defence is very allowable, especially where it is not prejudicial to others. But that I may give a more full Answer to those Gentlemen,

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and by the same breath, declare my self none of their party. Its not unknown to the World how much Anatomists have been branded with *Atheism*, yea such is the impudence of some, as to adduce this as Argument for their Infidelity, what say they, some of your Pulpit Orators will perswade us with arguments for the Existence of a God, from the frame and structure of Human Bodies: But such Gentlemen (say they) know least of the matter, if ye will consult the whole croud of Anatomists you shall find many, yea, and those of the first rank to be of another mind. But my reply to this is, I am sorry that any should have given ground thus to asperse the profession, and on the other hand, I might adduce instances to the contrary, shewing how some, and these none of the meanest have not only abhorred *Atheism*, but improved Anatomy for the advance of Piety. Next I say, in so far these first Rank Gentlemen (as they call them) have
act

To the READER.

act the Atheist, they declare themselves to be in so far ignorant of that Study, and this will be evident, if we take but a very cursory and transient view of the subject of Anatomy *viz.* the Body, Yea I am bold to desire them, the most daring Atheist among them, to point to the place and show which is it, that hath not the power and Wisdom of God, impressed, and that with such legible Characters, so as he that runs may read, which will appear in the sequel of this Discourse. Now among the herd of these Gentlemen that oppose Religion, I presume to speak a word to such who are Anatomists, if there can be any so stupid as to favour Atheism, for if there be, who deny there can be a speculative Atheist, I may much more doubt, if there can be an Atheistical Anatomist, for such of all men, see most of a God. But least there may be of this unhappy number, I address my self to such in a word, thus, if it be so, that you are guilty of Atheism

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The PREFACE,

ism, sure, of all men, ye are most unexcusable, is there not such Vestiges of his infinite Power and Wisdom to be seen in every Membrane ye Separate, in every Vessel ye Trace, in every Organ ye view and attentively consider, so that each in their silent Oratory cry out O BASTARD *Divina Sapiencia*, Strange! are ye the Men, they tax of Atheism? Tell it not in Gath, publish it not in the Streets of Askelon, Let not those Sons of Hell rejoice over your folly, and triumph upon your Ruins, for nothing argues more Folly than Atheism, its only the Fool that says in his heart, there is not a God, and what greater triumph can they attain then thus to unhinge your reason, and make you distrust Reason, Sense, and Experience in appropriating that to Blind-Nature, which is the immediate effect of Almighty Power, Be astonished O Heavens, be horribly afraid O Earth if we pass over the Isles of Chittim, and send into Kedar, shall we hear of such a thing as Men of Wit, to change their
Glory

To the READER.

Glory for that which doth not profite:
What Wit or Eloquence can excuse
your Madnes and Folly? what Mon-
sters of ungratitude must you be (yea
you of all Men) whom God has admit-
ted within the *Limina Sancta*, and has
allowed a place in his Chamber of Pre-
sence, to whom he has opened the repo-
sitory of his most precious Jewels, yea
set you over the cheif of his Works,
made you a little lower than the
Angels, in Crowning you with the Glory
and Honour of viewing the Works of
his hands, and prying into the sacred
Mysteries of Divine Wisdom, O then!
Pudet hæc opprobria nobis &c.

But I shall now goe on to speak to
other Readers; the struðure of the
Body of Man is one of the most a-
mazing peices of the Creation in it
we have a vast display of Divine Art
so that *Seneca* does wittily assert *Non esse*
hominem tumultuarium & incogitatum
opus and in another place *inter maxima*
rerum suarum natura nihil habet quo
magis

The PREFACE,

magis gloriatur. Here the Wisdom Power and Goodness of GOD are equally discovered, so that one is at a stand to know which of them surpass and transcend. Next those his adorable Attributes so conspicuous here are not only declarative of GOD, that is evince his existence and other perfectiones but may inflame the desires of a rational Creature upon the reflection that GOD by his Almighty Power has produced his being from nothing and imprest it with the distinguishing Characters of his peculiar Love in giving him such Majestie of Soul such comeliness and beautifull proportion of parts in the frame of his Body, whence he may be made to say *how fearfully and wonderful'y am I made,* and here also *Apuleius* saying may be fitly applyed *Maximum miraculum est homo animal adorandum atque honorandum.* Now if the effect be such what must the cause be, if the Clay-Vessel such what must the Potter be who makes Vessels for honour and dishonour

To the READER.

honour at his pleasure; may we not in an amazing, extasie, reflecting upon the Power and Wisdom of GOD in the conspiring harmony, agreeable sympathy, and curious composure of the different Organs so fitly fram'd and curiously adapted to their several ends and designs confess such knowledge to be too wonderful for us yea we cannot attain it.

Now the scope of this treatise is to give an Anatomical Essay upon the Viscera whereby is endeavoured to shew all of them to be either Muscular or Glandular or mixt of both that is having both Muscles and glands as their composing parts, and conform to those two general Organs is made appear those have also two principal actions to wit comminution or secernation (where by the way observe that where I insist little in proving a Viscus Muscular or Glandular it is either when the Anatomy of the part makes it evident or Authors do generally agree to it) And together with
this

The P R E F A C E,

this Essay upon the several Viscera and Fluids of the Body I intermixe some plain reflections upon the Wisdom Power and Goodness of GOD so evidently conspicuous in every part of the Body and these reflections were the sole designe of the treatise where I have done any thing Anatomical its only to be as it were a Vehicle to these reflections and therefore such exactness cannot be expected as there might, the treatise being Write on purpose to be subservient only to the foresaid reflections. Next these reflections are lame upon the account that they have not come from the hand of a Theologue.

But this shall have its design'd effect if its rude and unpolish'd stile shall stir up some better and smother Hand to Cultivate this method of Writing which if blessed of God, may have a promising and desireable Issue. I have likewise given a short Anatomical Explanation, of the first six Verses of
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To the READER.

the Twelfth Chapter of the *Ecclesiastes*, and by thir two Essays, I would have the Reader observe in the General the Reconciliableness or rather nearness and mutual Subserviency betwixt the studies of Theology and Anatomy, the conjunction of which Studies, may be a good mean to promote the Knowledge of our God and our self, which are the two hinges whereon all Reason and Religion must turn, and the only things wherein all Happiness in Time and Eternity must Center. Next we find the nearness of thir Studies pointed at in the very Practice of Men, one who is any way tollerably seen in the one, does ordinarily know something in the other, so that I judge this may serve to shew the nearness and subserviency which each of thir Studies hath to the other. which I could enlarge upon if place were allowed.

I shall likewise take liberty to shew to the Reader, that it was not any value I set upon this Treatise that occasioned

The PREFACE,

sion'd its seeing the world, or yet any Ambition I had of being among the croud of Writers, nay I judge I have in thir few sheets, rather given a discovery of my own weakness, and the sense I had of this, almost hindred my sending them to your hands, had not the hopes of concealing my Name, and giving my Testimony against Atheism, with the earnest desire of stirring up some better Hand, and more distinct Wit, to go on in this method, animate me to send thir rude Draughts to veiw, nay if my blurred and bespattered Lines stimulate some soaring Wit, and pleasant pen to compleat these dark and faint shadows with an *Appelles* hand, I have fully attained my Design. yea I have ground to hope, that some generous and worthy Soul will not disdain to improve his five Talents in ten this way, while such a poor lame hand, had the honour to hold forth the torch to shew where the pearl lyes, yea I desire to hope,
that

To the READER.

that not only light in the works of God shall increase among Anatomists, but also desire to discover the Wisdom, Power and Goodness of the same God, shall be more their business and delight, so I close wishing that *Seneca's* words may be fulfilled with respect to Anatomical discoveries,

Veniet autem tempus (says he) quo ista quae nunc latent dies extrahat & longioris ævi diligentia. veniet tempus quo posteri tam aperta nos nescisse mirentur. and the words of the Evangelical Prophet with respect to the knowledge of the Power, Wisdom and Goodness of God in Anatomical discoveries, *The Earth* says he, *shall be full of the knowledge of the Lord, as the Waters cover the Sea.*

AN

E R R A T A,

Pag: 50. L: 15. R: even in. Pag: 62. L. 15. R. of the
Pag. 65, L. 13 Vascular. Pag 85, L. 22. R. *Conspicere est Mus-*
culares, Pag. 144. L. 15. R. that Word.

THE HISTORY OF THE
CITY OF BOSTON
FROM THE FIRST SETTLEMENT
TO THE PRESENT TIME
IN TWO VOLUMES
BY NATHANIEL BENTLEY
OF THE BARR

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Anatomical Essay

Upon the

BODY of MAN.

The First Discourse.

Of the Viscera in general.



THE word Viscera signifies Organick parts of the Body, and is ordinarily limit to the Organs contain'd within the larger cavities. Now of those some are Muscular, others are Glandular, and some partly Muscular and partly Grandular, which in regard of order, obliges us to speak somewhat of Muscles and Glands in general;

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neral; So (after desiring to be excused for imposing names that may sound a little harsh) I presume in the general to distinguish Muscles into Cave, and not Cave: by Cave or hollow Muscles, I understand such as have a discernably large Cavity, and if for illustrations sake we may allude to the Ancients distinction of *Vacuum*; we may say such have a *Cavitas Continua*. by Muscles not cave I understand such as have no considerable Cavity, But Porosities: And alluding to the forementioned distinction of *vacuum*, we may say, they have a *Cavitas discreta* or *interspersa*: Now all the External Muscles are of this last rank, and with such we have little to doe here; they being Muscles appropriat for moving Bodies only contiguous to them.

Now the first sort, or Muscles having a considerable Cavity, are those we have to doe with in this Treatise. They contain various Fluids which by the Muscular Contractions, of those hollow

hollow Muscles, have their particles grind and divided, and moved both intestinally and progressively. That is their particles are not only agitate promiscuously together, but expelled or rather propelled forward.

Next those hollow Muscles differ, First in their operations and effects, as some are capable of contracting, and dilating, upon their within-contained Fluids. Others only of recoiling and refiling, when streatched beyond their spring, and yet thir, are as really Muscles as the former.

Lastly, These hollow Muscles differ in their figure and form, as some have hollowness of all dimensions (if I may so express it) hence such may be Spherical, oblong oval cubicall &c. others are Longitudinal (That is when their Cavity is more streatched lengthwayes) and such may be Cylindrical, Conical &c. as the several Muscular cavities ducts and canals of the

Body, their various formes and figures do evince.

Now as I have in the general divided the Muscles, so I judge the Glanduls may admit of a general division. They are commonly distinguished in Conglobate and conglomerate, or as others into vascular and vesticular: but I choose rather to divide them into vascular and Cribrous Glands, for I see not why any gland can be called vesticular, since all Vesciles, that are capable of contraction and dilatation (as I suppose all thir I speak of to be) are no more glanduls but Muscles. I grant those cribrous glands may also containe certain Acini or such like substances, but those Acini or small Bodies are alwayes perforate, and hence cease not to be Cribrous glands, but in a word Cribrous glands (as such glands are generally in Clusters or heaps together) may be defined to be a congeries of perforate membrans, and vascular glands a congeries of perforate fibres.

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The Fluids passing both are deposite in their severall excretory ducts. I desire to be pardoned for presuming on thir unusual divisions and subdivisions of Muscles and Glanduls.

Thus having given a general hint of Muscles and Glanduls, I shall endeavour to reduce the severall Viscera, to those two heads of Muscles and Glanduls. And first its a generally receiv'd Axiome that nature works most singly, and hence these proverbial expressions have got place: *Natura non facit circuitus*, and *natura non abundat in superfluis*. And since its indisputable, that *frustra fit per plura quod fieri potest per pauciora*, how highly unreasonable is it to ascribe so many different substances (or parenchymas as they call them) as there are different Viscera and a different and distinct action or way of operating to each of them.

Next considering that Nature, or rather the God of Nature does much by a similitude and likeness, that is he pro-

duces variety of resembling causes, having also resembling effects (hence the Macrocosme and Microcosme are comparative, and bear so near an Analogy, and Matter and Spirit have such likeness and resemblance in their several Attributes as the Author of the *Recherche de La Verity* evinces, in making the one illustrative of the other) whence it appears we may rationally infer that the several Viscera which are produced by the same hand may have likeness in structure and actions, consequently are reduceable to a few kinds. And this will further appear as we trace their several structures. Now having premittted these, I propose a few things which I design to make evident either in this Chapter, or as they more conveniently occur in the sequel of the Treatise. And first I design to make evident all the Viscera to be either Muscular or Glandular, or partly both Muscular and Glandular, and their cheif Actions to be Comminution and Secernation.

Second-

Discourse first.

7

Secondly, That the resemblance and likeness the Body bears to the Macrocosm and whole frame of Nature, does fully evince it to be a product of the Same power and dropt from that very hand *who weighs the Mountains in Scales and the hills in a ballance, who binds the influences of Plyades, and looses the Bands of Orion, who brings Maseroth in his season and guides Arcturus with his Sons.* (Observe I have cited so much of the Text, not only for the connection, but because I judge these words carry such Majesty of Stile that may convince an Atheist, that the Scriptures are the word of God.)

3dly That the uniformity and resembling similitude of the structure and actions, of the several viscera, the curious compofure, the amazing texture of their frame, so suitably adapted and fitly moulded for the designed effects, are evidently demonstrative of the Being of a God and no less declarative of his Almighty Power and Infinite Wisdom.

4ly and lastly that God is Graciously Communicable in revealing his will and that he wills his People to know this peice of his Workmanship (to witt the Body) and as he makes the Body a commentary of his goodnes, so of its own frame being explicatorie of it self by discovering its minute parts and their obscure effects by the more bulky viscera and evident actions. And hence his adorable condescendence to the weakness of his rational Creatures does evidently shine.

Now I return to the first viz. That all the viscera are either Muscular or glandular, or partly both; and their principal actions either comminutorie or secernatorie or both. Therefore since all the viscera and their various actions are reduceable to those named we see not why *Entia multiplicanda sunt sine necessitate*: But that they are evidently reduceable to those will appear clearly as we run throw the several viscera, therefor I shall refer yow till then, where it will not only appear that all the Viscera and their
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various effects, are reduceable to the two forenamed heads But likewise that they can not be reduced to any others then those.

The 2^d. is that the resemblance and likeness the Body bears to the Macrocosme and whole frame of nature, does evince it to be a product of the same power by which the whole frame of nature, (viz. the Macrocosme) was produced. Now this supposes that the belief of the universe being a product of Gods power is more easily received, and universally assented to, then the Body of Mans being a product of the same power. Truly I think the knowledge of this (to wit the Universe being a product of God's power) though no more true than the other, yet seems to be more obvious. And hence the *Epicureans* and others have asserted, that the viewing of the heavens, the regular rising and setting of the Sun, the constant and uninterrupted vicissitudes of Day and Night, was the only reason, that the
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the notion of a God came into the world. And Cicero *de Natura Deorum* lib. 2. sayes *Quis hunc hominem dixerit, quicum tam certos Cælei motus, tam ratos Astrorum ordines, tamque omnia inter se connexa & apta viderit, eaque casu fieri dicat &c.* And a litle below adds, *Non dubitamus quin illa opera sunt rationis etiam excellentis divinæque rationis &c.* Now if any beleiving the Universe to be an effect of God's power when he reflects upon the great similitude and resembling Analogy that is betwixt the Universe and Man's Body which is fully evinced by those who have run the parallel betwixt the Macrocosme and Microcosme, and yet futher evident if we consider the Spirit of God in the Wisdom of the Preacher, choiseth parts of the one to signify parts of the other. As we see in the 12 of Eccles: *While the Sun or the Light or the Moon or the Stars be not darkned nor the Clouds return after the Rain.* All which are taken to represent parts
and

and effects in the Body. Hence their likeness appears.

And as nothing is more usual among Men, than to judge of the Worker by the work, and of the cause by the effect, and from the similitude of resembling effects, to judge them effects of one and the same cause. Hence it is clear, that the likeness betwixt the Body of Man and the Universe, argues them to have dropt from the same hand. 3^{dly}. The uniformity and resembling similitude of the structure and actions of the several Viscera: The curious Composure, the amazing Texture of their Frame, so suitably adapted and moulded for the designed effects, are Demonstrative of the Being of a GOD, and Declarative of his Infinite Power and Wisdom.

Now that the several Viscera have uniformity and likeness in their structure and actions (at least those of each kind among themselves Muscles to Muscles and Glanduls to Glanduls) and all of them a curious composure as to Texture

ture and Frame, that they are suitably adapted and fitly moulded for designed effects, and that those are Demonstrative of the Being of GOD, will be evident as we Treat of them severally, but here in the General we may say, that their similitude of Structure and Actions argue them to have dropt from God's hand, whose Oneness and Sameness in Operations, discovers His Unchangableness in Working and Perfection in Work; which two are Incommunicable to any Finite Being. And next in the General we may say their curious Composure and Frame may be more then evident, if we reflect upon the Infinite Wisdom of the whole Trinity at work in this Business, *Let us make man* says the Sacred Text, from which one most judiciously observes that he takes *Seneca's* words to be a good Comment upon this Text. *Scias* (says *Seneca*) *Non esse hominem tumultuarium & incogitatum opus.* And since this expression came from one who

who had not that opportunity (either by Revelation or Anatomy) of making such profitable Reflexions as we, may not all now at first view discover, the Being and Power of a God in each of the Viscera, their Frame and Make being such as bear it in most legible Characters, but as I said before, this will more clearly appear in running through them severally. Lastly that the wise Author of Nature is Communicable in Revealing himself, and wills His Rational Creatures to know this peice of His Workmanship, and hence makes the Body a Commentary of His Goodness and Explicatory of its own Frame and Actions.

Now that He is Communicable, and wills His Rational Creatures to know this peice of His Work, is evident, not only because they cannot Admire and Praise that they do not Know, (*Ignoti nulla cupido*) but even in this peice of His Work, He has left the signatures of His pleasure. For in-
fnace

stance He has given Lights (so to speak) where the Darknes is greatest, for when he had made the Body, and parts composing the same mostly Muscular and Glandular, he would make some of them large Muscles and others large Glanduls, to shew what sort of structure and use the smaller had, and to exemplify further he would evidence what was a Muscular Structure and Action by the larger Muscles of the Heart, Intestines, Stomach and Bladder &c. Next He evidences the Structure and Actions of Glandulous Bodies by the larger Glanduls of the Brain, Liver and Pancreas. Now the goodness of God to His Rational Creatures is also displayed in His willing us to know His Work, and for that end discovering the more secret Viscera and parts constituent of them and their more obscure effects, by the more bulky Viscera and Manifest Actions. Hence also the Body is explicatory of its own Frame, this will be evident if we consider

sider that those bulky Viscera and their manifest Actions, are as it were Inscriptions in the Body write by the finger of God, discovering the more minute and obscure by the more clear and manifest. Now if any curious Mechanick (*Abstet Blasphemia*) should make a peice of work, or several peices of curious work not easily known as to their use, and should inscribe each with their several Inscriptions, shewing this to be such a Machine for such an use, and another such, for another use, would not all conclude the Communicative Mechanist designed his peices of work to be known and understood. Now the case runs parallel here. Hence we see that God would have His work known by His Rational Creatures, since He has given such legible and clear ways whereby we may attain to the knowledge of them, yea such as *he that runs may read.*

Of the Viscera in Particular.

I begin with the Abdominal Viscera they being ordinarily first dissected, because most obnoxious to Putrefaction, and next in regard here are the *prima via*, and the Mouth being the common entry to the Body (which I compair to a great House or Building, consisting of many Apartments of different magnitude and use) from which entry ye may trace the various passages throughout the whole. I have chosen the similitude of a House or Building, because this is the fittest representation to Illustrate the Natural OEconomy: For Instance, as there is in a Building greater and smaller Apartments of various use, by an universal harmony conspiring to the general end of Conveniency: So in the Body there are many greater and smaller Viscera of various use, and conspire with an universal harmony to the general end of Na-

Natural Life. Another reason why I was induced to make choice of this similitude of a Building, to Illustrate the OEconomy of the Viscera is this: That surely most be the fittest similitude that Wisdom it self pitches on, when *Solomon* would discover mans Frailty, and Anatomise him in his Death, he assumes this similitude, and makes the Allegory run in the case of a decayed Building, therefor I shall run the similitude as near as I can, and compair the Body to a House, the several Viscera to the several Apartments of the Building, I know if I were to expatiate on this, and could enlarge so as to cause it run parallel in most cases with the thing represented, it might be somewhat curious. But since I am only to view the Viscera, there will be much of it wholly extrin-sick to my business, and the fancy will be lame in regard of what it might be, if the similitude had been exactly prosecuted at its length. But we shall take it so far as our purpose will allow.

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Now

Now all considerable Houses have their outer Gates of Defence, at some distance from the Apartments of the Building, so this is resembled by the Mouth at a pretty distance from the Stomach or first Apartment of the House, now as the lips (in Wisdoms terms called the *doors of the streets*) do represent the folding Gates or outmost Gates within which are the Teeth somewhat resembling the Palisadoes of a Fortification, then passing this outer Entry so strongly Fortified, the Gullet as a long avenue or trance, leading into the first Apartment of the House is widened in its Cavity at its insertion into the Stomach, which widened extremity does represent the Vestibule of the House, which vestibule openeth into the Stomach or first Apartment of the House; where by the way some may tax me of halting here in my similitude, shewing me my Architecture is very ordinary, making the Entry to the Building through the
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Kitchen of the House: To which I answer this is Natures way *que non abundat in superfluis*, hence I conclude Conveniency not Grandure is designed, so that when any affect such nicety, they deviat from Natures simplicity. Now in the Stomach there is a large cavity where chyle for sustaining Natural Life is made; I might treat of the Gullet, Stomach and Intestins as a continued large Muscular conduit dilating it self to a prodigious bulk in the Stomach, seeing their structure in every thing seems to be alike, only in Cavity this may be plausible: But since they are treated distinctly by Authors, I shall also speak of them severally. And first,

Of the Gullet.

I omit speaking of the Pharynx, as also giving the exact Anatomical structure of the part, all I have to do is either to prove it Muscular or Glandular as I undertook above. And first most Anatomists I know do ascribe to it Muscular Fibres, nay many not only of the

more Modern but some of the almost Antiquated Pens, as *Hoofman* and *Lindanus &c.* have asserted it a Muscle, which so universal consent makes my Work here easy, but to Fortifie I add, Whatever has the Essential Properties of a Muscle must be a Muscle, but this has the Essential Properties of a Muscle *Ergo &c.* Now the Essential Properties of a Muscle is Contraction and Dilatation by Muscular Fibres. All which are here; Some will object, all Muscles have membrans, and in *capite & cauda tendons*, but here is none. I answer first *ex abundanti* I know these are always found in the External Muscles, but that they are to be found in Internal hollow Muscles such as ours are I know not. But however grant they were to be found in internal cave Muscles, I answer the outer and inner coats are tendinous, and if a membrane be demanded, we may separat one, and yet not deprive our selves of the head or tail of
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our muscle. Now I have the more enlarged upon this because it will not be necessary to repeat this in other Longitudinal hollow Muscles, their Form and Structure being much the same, and Naturally they all propel their inwardly contain'd substances. Now the Structure of the Fibres of the middle coat of the Gullet, are by *Bartoline* and *Diemerbroeck*, said to be circular and transverse, but I suppose they have called them transverse, because they cut the Circular Transversely. But as to the Gullet they are rather Longitudinal, going from the Pharynx to the Stomach. This Structure of Fibres, viz. Longitudinal and Circular are peculiar (as I conceive) to Animals that receive their meat in perpendicular posture, such as eat *erecto vultu*, their Gullet being Perpendicular to the fundus ventriculi, if we compair it to plain. but such Animals as gather their meat *vultu demisso* having their Gullets as it were in a parallel posture,

that is in a parallel to the Stomach, it being a very different position from the former, necessarily required Structure of Fibres differing, else Deglution in those could not be rightly performed. Therefore such Animals have a Spiral position of two ranks of Fibres. I see it observed by some, that there is a singularity in thir two ranks of Spiral Fibres as they intercussat one another they do it so, as what is Superior now, is Inferior next Intercussation, hence I think that this position is most fit for the Deglution of those Animals, that have their Gullet Parallel as above. I know *Willis* and *Stenon* seems to attribute this Structure to all Animals promiscuously, but I differ from them in this, Now as Deglution is performed partly by the Tongue and Muscles of the pharynx and by the Gullet it self, all its ranks of Fibres conspiring thereto.

For I am not of *Willis's* mind who thinks the descending Fibres in the Gullet serve for deglution, and the ascending for
Vomi-

Vomition, but I judge they jointly act in deglutition, it being their natural motion, and Vomition is an inverted preternatural motion of these Fibres. Since I have spoke of the way how deglutition is perform'd I shall also briefly define it. I judge it may be defin'd a conveying into the Stomachs cavity what is once admitted by the pharynx, now this could not be done wholly by the gravity of things assum'd (even in Animalls, that have a perpendicular erect position) many of the assumed things being of a clammy Viscous substance, and some of such magnitudes as necessarily require violent propulsion: But more violence is required in protruding the things assum'd by those that eat *vultu demisso* from all which we see muscular propulsion necessary, and that by a particular Mechanical structure by intercussation of Fibres, which acting do abbreviat and straiten the ductus, whence the wonderful Power Wisdom and Goodness of God is evident

dent, in fitting in so wonderful a manner the frame of this conduit, wherein if the Fibres had been only circular or only longitudinal it could not have done but both must concur, so in these Animalls that in deglutition have their Gulletts in a parallel or which is worse in an ascending position a greater apparatus is necessary because the gravity of the things injected could take no place in those, therefore such a frame as was only capable for such propulsion is produced here. Now one look of this mechanisme may sufficiently confound the Atheist, what blind casualty, could have produced this wonderful texture of intercrossing and oppositely acting Fibres, yet harmoniously conspiring for the end of deglutition; And these are but parts of his wayes. *O how little a portion of him is known.* I have been purposely the longer here, because I think this sort of structure will much explain, and be of kin to all the Canals and longitudinal ducts that have a vermicular or peristaltick motion. And

And it may be most of the Vessels and ductuses of the Body are of such a structure as admit of an obscure muscular contraction and dilatation. But this being extraneous to the subject in hand I leave it. So after passing the Vestibule (which we call either the lower extremity of the Oesophagus or the upper entry to the stomach, this being curiously surrounded with nerves from the sixth pair representing watches or centinels to discover the approaching ingress of Enemies sounding alarme to all within) so keeping our similitude we enter the first apartment of the building, the Cavity of the Stomach.

Of the Stomach.

THIS some call the Kitchen of the Body as cooking to the whole, the action of this Viscous is Chylification. I stay not to give an exact anatomical description of it, all I do, is to shew it either muscular or glandular or partly both, and its action either comminution

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on or fecernation or both. And it is really both muscular and glandular, cominutory and fecernatory; if we consider not only its muscular frame but the glandules it hath in its inner Coat that does separate alymph, which together with the Saliva and Drink does humifie dilute and attenuat the Meat. But in regard the most considerable part of its work, is performed by the action of its muscular substance, it shall carry the denomination of a muscle. And as I look upon the Stomach to be the continuation of the same substance with the gullet; with this difference only that the viscous is hugely dilated in the Stomack constituting an hollownes of all dimensions, which of necessity it was to have, for containing the assum'd aliment. Therefore I think it hath the same longitudinal and circular Fibres, only the expansion of the viscous to such a considerable widness; makes them appear different. I stay not upon its anatomical structure, it hath three
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tunics, and an internal glandulous coat, and if any will have a *caput & cauda tendinosa* I please them as in the former, by allowing them the tendinous coats, and a membranous expansion may yet be separate from the outer, and the muscle not be deprived of its tendinous caput. And I affirm, Chylification is performed not by *Coction* neither yet by an *assiduum corrodens*, neither by *fermentation*, either of *Salin* or *asside ferments*, or by extraction of any *digestivementruur*: but by the *muscular motion of the Fibres of the Stomachs middle coat*; the Meat being before sufficiently diluted by Drink, *Saliva*, & *glandulous juice* from its glandulous coat. I will not wholly exclude fermentation where it proceeds from the air that goes into the Stomach either by the *oesophagus* or by the pores of the aliment. and I am of that mind if there be any fermentation either here or in any fluid of the Body, it proceeds solely from the admixture of air. for
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how ferments should be produced and where they should have their Latibula, and how they should produce such effects I see not. Next the necessity of air for digestion will appear in this, that nature has given a passage for air to the Stomach of Fishes; for in those from the *vesica natatoria*, to the Stomachs cavity, reaches a *ductus*. which gives much probability to this hypothesis of air being the cause of fermentation, and partly of digestion; such animals having seldome free access of much air, being mostly immerg'd under Water, and hence Nature has provided them a way for its Conveyance, from the *vesica natatoria*. I know some will, say whence can this be called a fermentation, since the air cannot be called a Ferment. I answer all the definitions that ever I saw of Fermentation supposes not alwayes the admixture of a gross Fermentitious body but rather an intestinal motion of the particles, which some ascribe to a subtile Ether lodg'd in the pores

pores of the fluid, and by the admixture of an other heterogeneous fluid, the pores being streitned, this subtile matter agitating the particles of the compos'd fluid makes way to it self through the body of the fluid. Hence a motion of its particles, sometimes greater sometimes smaller and the Air goeing toward the surface of the fluid, produces various *bullula* on the surface, and this intestinal motion of particles being greater or smaller, the Fermentation as its called is more or less. And hence the various sorts of Fermentation. As bubbling, elevation, effervescence, sparkling and exhalation are only differing as to *magis* and *minus*. The subtile Ether or rather the air contained in the fluids being more or less resisted by the particles of the fluids. Now I say, hence it appears that an intestinal motion of particles and a mixture of heterogenious particles is necessary for producing fermentation, but that such a thing as a particular gross ferment, distinct from the

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the subtile Ether and air above al-
leadged, is essential to it I see not. If
it be answered, that in Ale and such
Liquors supposing the admixture of
several sorts of Liquors together, yet
they will never rightly ferment with-
out the addition of yest. Here is a fer-
ment produceing fermentation and
doubtless their will be air and subtile
matter, before in the pores of the Ale.
I answer that this might be that there
was air and subtile matter, before in
the pores of the ale; but not so much
as to produce its fermentation which
if there had, there would be no need
of yest, which produces ferment-
ation no other way (as I conceive)
then by containing in it a great deal of
air. For I take yest to be nothing else,
but a Fluid Body having a sort of
viscuosity, hence more capable then
other Fluids to contain and re-
tain air within its amplexus. So I think
we have brought it to this, that the
mixture of external ferments is not ne-
cessary

cessary essentially for Fermentation. But rather heterogenous Fluids containing some subtile matter within their pores. Next we are to see whether it is more rational to think this subtile matter to be a sort of Ether (of which we can give no Demonstration nor can we know its Properties, or understand any thing about it, save that some effects require some such subtile matter to explain the Phenomena concerning them) or Air it self, whose Existence and Properties we understand, and whose effects when mixt with Fluids are Demonstrable to be such as we see in Fermentation. Now that it is highly rational, to think this Body and Fluid to be Air, and not a Fictitious Ether, of which we know nothing about, is clear. Thus I judge none will deny that the Elasticity and Gravity of the Air, two so much known and demonstrate Properties thereof, are more likely to concur in Fermentation then the other light fancied *Certesian* Ether. Now I
might

might evidently shew that Gravity and Elasticity are most necessary Properties in a Fluid capable to produce Intestinal motion of the particles of others mixed Fluids, by the first it insinuates it self into the pores of Fluids, by the 2^d, it dilates and expands the said pores, and so makes an Intestinal motion of their particles and causes the Fluids occupy more space, which in my opinion is really Fermentation, but this is too tedious a digression, it being none of my business to speak of Fermentation, nay nor yet of Chylification unless in so far as I shew how the Stomach performs the office of a Muscle.

And truly I am of the mind, that Chylification is performed by the muscular motion of the stomach, and it may be assisted a little by the *musculi abdominis* and *diaphragme*, and a little by the admixture of Air; which I am the rather inclin'd to think; since of necessity the Air does mix with the Blood, and it cannot but enter by the mouth
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Discourse First.

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and Oesophagus, yea even mixt with the Aliment, and since it cannot be proven, that it hath access by the bronchæ and Lungs; I conclude this to be the *via Regia* for the Airs access to the Mass of Blood. And next considering that the Stomachs Muscles in several Animals are but slender and scarce able to dissolve some solid and firm substances, that we see swallowed and dissolved, it may be thought the *Vis Elastica aeris* may be of great use in dividing and dissolving those firm substances thence helpful to the Muscles in digestion. Then if we reflect upon the ductus mentioned in Fishes for transmitting Air to the Stomachs cavity, and the great benefite as to digestion by having a free air, and prejudice accrewing to it when deprived of free air. All seem to conspire, in asserting the airs access to the Stomach, and probability of agency in the business of digestion. Next it remains to show how the Muscular motion of the Stomach digests

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the meat? To this I Answer, That it is chiefly by contracting and dilating it self upon the within contained substances, and thus grinding their particles, agitating them one against another; this, might some say, would soon destroy its Coats, and lacerate its Fibres: I say this is prevented by a constant supply of nourishment to them.

2^{dly}. Its contractions are so wisely ordered, that what suffers most by collision this instant suffers least next instant.

3^{dly}. The wisdom of nature has so defended its Fibres by the Inner-coat being the Excretories of *Pyerius* Glands and they doe most thickly invest the inward Cavity and make a Coat resembling Velvet, both for thickness, and softness, and the extremities terminating in the surface inwardly this wonderfully defends its Muscles, against the injuries offered it by the collision and grinding of the inward substances. And then as its Fibres are Comminuto-

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ry, they are also expulſory, having ground the Aliment they expell it to the Intestines. Here one may clearly discover the Power, Wisdom and Goodness of God in the frame and action of this viscus, here such a frame was necessary as could extend and widen, contract and straiten its Cavity, to the proportion of the Meat and Drink assumed. Next this Cavity being for Comminution and digestion of the Aliment, there is access for Air and Saliva, and it hath also inward Glands that afford lymph, for farther macerating and diluting the same in order to facilitate Comminution; and this being so necessary for chylickation, nature has given this cavity Fibres, for contracting in all its dimensions. And if this Fibres had not been defended with a mucous tunicle (which is not only the Glandulous Coat, and their Excretories, but a certain viscous mucosity, issuing from the extremities of the excretory ducts of Pygerus Glands, in the fore-

said Coat) they would inevitably sustain great injury, by the frequent contractions and collisions upon the solid Bodies, in the assum'd aliment: and thus man should have sustained his Life, with pain and torment, and would rather have chosen pinching want, as paining nourishment. But here not only Power and Wisdom in contriving and framing a suitable viscous, for the aliment does appear, but goodness is manifest in giving it the defence of a suitable tunicle to prevent the laceration of the Fibres: by which, means for procuring Life would be a continually approaching death, if goodness had not thus prevented pain and Torment. And next the very situation and figure of the Stomach argues design and wonderful contrivance for as it was necessary that it should retain the Aliment for some time, So its Orifice called Pylorus is situated so high, as the Chyle cannot pass easily out without a considerable contraction

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of its Coats, and hence is prevented the hasty egress of things assumed without sufficient digestion and comminution. Here is an evident demonstration of Goodness and Wisdom; for if this viscous had been so fram'd as to have had its under Orifice or egress in a direct line exactly opposite to the ingress of the gullet, then all should have too quickly passed upon the least contraction, and chiefly in Animals that have their Body erect, the gravity of the things assum'd should have forced their exit to the Intestines, before due digestion: so Chylification would have been imperfect and the Body depriv'd of suitable nourishment. Whence Wisdom and Goodness equally shine, and may sufficiently instruct us of the care and tender regard of a wise provisor and bountiful Benefactor. Now passing the Pylorus we enter into the conduit of the Intestines.

Of the Intestines.

NOW as for the Mesentery and its Glands, receptacle of the Chyle. *Omentum &c.* These I look not upon as *Viscera*, so stay not upon them; but that we may hold by our similitude I shall compare the Intestines as representing a long trance or conduit leading toward the backpart of the building and terminating in the common sink or Jax of the House whereby all the nastiness and filth of the house is ejected, now that such passages actually are, yea and necessary in a building is indisputable, and since they are so fitly represented by these parts of the Body we could not suffer our similitude to halt, and be defective here. But as to the structure of the Intestines they are a continuation of the former Muscular conduit, and having the same Tunicles yea and Fibres both longitudinal and circular, as the former had, they have likewise a Glan-

Glandulous Coat as the former, whose excretories terminate in their Cavity for lubricating the same, and attenuating the Chymus: as also these Glands demonstrate by *Conradus Pjerus* are by him assigned as emunctuaries where these humours separate from the Mass of blood in purging are deposite, and by their short Excretories discharged into the intestines to be ejected by stool. And that those Glands and their Excretories perform the foresaid evacuation is evident by the experiment of *Nicolaus Pehlinus*, who in a live dog having injected the Arteries nothing is found to pass into the Cavity of the Intestines, thereafter peirceing the mesentery and making two Ligatures upon the Intestine (the Animal before having received a Cathartick Medicine) a hudge quantity of serous Humour was found in the peice of the Intestines betwixt the Ligatures. But begging pardon for this digression I return to the matter in hand. This Muscular duct gives passage

sage to the Chyle and fæces, and their convenient structure make them serve a three fold use, by means of their vermicular contractions. First, they separat the Chyle from the Fæces pressing the first, into the patent Mouthes of the Lacteals, and protruding the last downwards, ejected by stool. Lastly, their Glands, pressed by the contracting upon the contain'd Chymus, doe deposite Glandular Juice into their Cavity for attenuating the Chymus, in order to the better separation, and farther attenuation of the Chyle. Now we come to reflect upon the structure of this viscous which has the same things to be admired, that the foregoing had, and no less Wisdom and Goodness discovered in its frame, yea here also the contraction of the Muscular Fibres serve two turns more than the former. *viz.* The separating the Chyle from the fæces, and insinuating it within the narrow Mouths of the lactealls propelling it foreward in them. Hence as Wis-
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dom is evident in their structure, so no less Goodness in their figure, their Fibres so fitly acting their parts, and their turnings and circumvolutions, hindering the too speedy descent of the Chymus (by which I understand the aliment digested but not separat from the faeces) before the Chyle be fully separate from it. Hence the Body is supplied with plenty of Chyle, which is the very matter of its Sustenance. And here Wisdom and Goodness equally shine in making those very conduits (I mean the *prima via*) to be importory of whats necessary, and exportory of whats redundant. Here are the very *Natura cloaca & turpium emunctoria*, the receptacle of the Bodies filthyness and draught of all its nastiness. Yet in these places nothing wanting in Structure, site and figure, that could render them subservient to the whole, or assisting to any part. And in viewing thir, there is not only a discovery of our Sin and Frailty: But
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of God's Condescendence and Pity in considering our Infirmities; and thence so Wisely adapting Organs suiting our Frailty and necessity. Next we remove from this Muscular Labyrinth, and keeping fast by our similitude, we shall enter a Glandular apartment intending to view all the Apartments of the lower, before we go to the 2d, Story or Thorax. So from this Muscular Conduite, being led by the *ductus wirsungii* I go into the Pancreas.

Of the Pancreas.

I stay not to give an Anatomical Description of this Viscus, that being fully done by other hands, all I do is to assert it either Muscular or Glandular, and; that it is the last, is evident by all the Moderns that have wrote upon it. This is one of these Viscera that are only Glandular, it secerns a certain Juice that is carried by its Excretory Duct in-

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to the Duodenum, where its deposite, for attenuating the Chyle (for I have no credite to give to the Hyperboles of *Sylvius* and *de Graaf* on this subject) and that is evident also to be the use of the many Glands in the Stomach and Intestines discovered by *Peyerus* and *Wepferus*. I say now more of this.

I shall here take notice of a fancy I have had of a long time, which not seeming so very improbable, I shall submit it to Censure, it is this, I conceive there is a circulation of these Glandular Juices and Bile, to and from the mass of Blood. I know there are sundry difficulties that strike against this Hypothesis. As first some may say these Glandular Juices and Bile are Excrementitious, so hurtful to the Body and for their ejection Nature has fitted them with Excretories opening into the common jax. I answer they are not wholly Excrementitious, else they would never be mixed with the Chyle, or had their Excretories insert so far up in the

the Intestines. Next it may be objected if Nature had designed these to circulate and mixe with the Chyle, then why were not their Excretories insert rather in the receptacle, or Glands of the Mesentery, especially those of the Bile and Pancreatick Juice, since Nature works always by the shortest ways? I answer, then they could not have attenuate the Chyle in the Intestines to make it pass through the small *Lactæa primi generis*. Next if these Excretories had not been insert in the Cavity of the Intestines, then there would not been a way for Evacuation of superabounding Humours from the mass of Blood in Natural or Medicinal purgations. Next it may be objected, there can be no Circulation where the Fluids are once Extravasated and into a Cavity. I Answer, then the Blood Extravasated in the Celluls of the Spleen, or in the sinuses of the Dura Mater, or in the Ventricles of the Heart, could not Circulate: But if it be replied these are not so considerable Cavi-

Cavities, I grant they are not, but the small Intestines where thir are deposite are not so very large, but the Vermicular and peristaltick motion may supply that, by their lessening so vastly the diameter of their Cavity, which that they do easily appears by their Vermicular Contractions. Next considering the great quantity of Bile and pancreatick Juice, And the multitude of Glands in the Stomach and Intestines (all which constantly seern) there would be a very considerable discharge of Glandulous Juice, yea such as would occasion a continual diarrhea, if it were not constantly pressed into the Lactez by the Vermicular Contraction of the small Intestines. Then if these Glandular Juices were not still Glideing the *lactea primi generis* when not replete with Chyle, I see not what should hinder their growing together sometimes, and so lose their little slender cavities, since Chyle does not always pass them, yea
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sometimes for a considerable time as in sick Mellancholy and Maniack Persons, Children in the Womb and such like, yea if ye allow of a Mechanical Formation of Organs, I know not but this may be the very fluidum cavans for producing the *lactea primi generis*. But having digressed too far, I return to the Pancreas, which before I asserted to be wholly Glandulous, having nothing Muscular in it, it is composed of many small Glands, each of which constituting Glands, emit an excretory, all which uniteing constitute the large Excretory called *Ductus wirsungii*. *De Graef* shews all this at large, I confess some may say, how is this consistent with the so much admired Wisdom talk't of, since here is a part that can be cut out, and yet the Animal live both Agile and Nimble. As *Conradus Brunerus* proves by his practising it on a Dog in presence of *Wepferus* and others. I answer this has doubtless its use in the Animal OEconomie, since its never want-

wanting, and then much of this Viscus might be taken away in these Animals, yet not all. And truely its hardly possible to take it all away in alive Animal, its so attasht to the membranous Viscera along its whole substance, and any of it remaining with the *ductus wirsungii*, being intire might supply the want of the rest, and I truly judge *Brunerus* and others have been mistaken this way, when they judged they had cut it out.

And then we see it hath a great use in attenuating the Chyle as I told above, and wisdom is evidently seen in its structure, by its having a multitude of small glands constituting one great one, and a deall of small excretories composing one great one, thus making the great gland and big excretorie, explicatorie of the lesser composing them, yea and of others of each of their kinds. Yea the very Situation and connexion of it denotes wisdom and goodness, it being so tender and soft a
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viscus is Situat as it were in a defence, by the Stomach and duodenum, and its connection to these soft membranous Viscera argues this: For if it had been connected to hard Bodies as the Vertebrae and Ribs, their motions might have lacerat it, or any small weight pressing thereon, might have occasioned stagnation in it. Then if it had not had its duct with a depending egress and moved and pressed with the continual motion of the muscular Viscera, the stomach and *duodenum*, and it may be by the pressure of the Muscles of the abdomen its succus could not been so well conveyed to the *duodenum*, it wanting a Muscular propulsion in its own Viscus, whence it was secerned. Now do not these argue Counsel and Skill, yea such as evince clearly the ways of God to be ways of Wisdom. The next Apartment I go to is also a Glandular Apartment, and by its *ductus*, from the Intestines we are led to the same.

Of

Of the Liver.

AS we observed of the former, that that it was a Viscus composed of so many small glands all which unite constitute the great gland, and so many small excretories composing the great excretorie, so here you see the many small glands composing the Liver, and the many small *biliary ducts* the *ductus communis* and vesicle or if ye please ye may consider the whole viscus as an intire gland, and the whole *biliary Vessels* as its excretorie, not regarding the expansion of the Vesicle but as an enlarged part of the excretorie, which the wisdom of nature has expanded, not only to act the part of areceptacle, but it may be to be explicatorie of the structure and contraction of the other smaller *biliary ducts*. I need not stay to prove at large the glandular structure of this Viscus, *Mapighius* has done this sufficient.

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ficiently so we have little else to do here, but to shew the admirable mechanisme of this viscus. It will be readily granted that the principal constituent parts of glandulous Viscera are so many cribrous and vascular bodies, Secerning fluids from the mass of Blood, and this they do solely by percolation and permeation if so I may express it, hence a glandule ~~qua~~ glandule, cannot contract it self for propelling the fluids it admits. (for whatever is to be said, of the vermicular obscure motion of other Vessels, I think it wholly wanting even vascular in glands) from which it will appear that these glandulous viscera are most obnoxious to stagnationes, I mean the fluids passing through them do more readily stagnate then in muscular viscera that propel by the contraction of their fibres, hence the wisdom of the God of Nature has prevented the stagnations of glandular fluids (that would have inevitably followed upon such a structure, and so

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at every minute the Circulation would
been interrupted) by several sorts of
mechanisms in these several viscera,
we have already shewed this in the
mechanism of the pancreas viz. Its slender
Body and contiguity to muscular
viscera, by whose contractions and dilata-
tions its fluids are preserved from stagna-
tions within its substance. Now one
would think, the Liver is not a slender
thin viscus but hugely thick, and has
no communication with the motions of
membranous and muscular viscera, so
as to have its fluids propelled through
its substance by their means, hence some
with the blasphemous *Alphonfus* King of
Aragon might assert Nature had made
a bungling peice of work in giving the
Liver the situation and bulk which
renders it incapable of the mechanism
of the former, for propelling its fluids.
But let these monsters of Nature stay
idle, and we shall shew them as much
admirable wit and contrivance here as
elsewhere. And first this will appear, if

we consider its Situation which is such though it be not immediatly adherent to muscular viscera, so as to have much aid to the motion of its fluids therefrom, yet it hath an obscure motion (as I judge) by means of its deeply rooted ligaments adhearing to the diaphragm by whose motion it doubtless has a considerable agitation by which agitation its fluids are some way propelled. But you will say this motion may as well repel as propel: I answer, not only the progressive tendencie of the fluid it self dos resist the retrograd motion of the same fluid, but together with this, the descending situation and protension of its excretorial ducts help very much in the business of propulsion, and hence it prevents stagnation, But chiefly the figure of its vessels all which (excepting an inconsiderable arterie which has its puls) do gradually widen as its fluids goes forward. Now the figure of all veins being from a lesser to a larger diameter, there can be

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no stagnations in them and the figure of the smaller biliary and Limphatick ducts are also from a smaller to a larger diameter hence there can be no great fears from stagnation in them neither: And I think its a wonderful evidence of Gods goodness in the frame of this viscus that its vessels are all such as will not admit of stagnation; for the many ramifications of small vessels that are in it would inevitably caused stagnations if the half of them had been arteries, but to prevent this the porta supplies the pairt of the arteries, and ye know as I said just now all venal ducts they from a narrower cavity gradually enlarge and widen so as their fluid goes forward it still moves with greater ease and facility and no doubt but the vermicular motion of the vessels themselves does also concur with the descending progression and coninverted figure of its venal and biliarie ducts. But lastly that all blasphemous Atheists may see wisdom act its part in this very viscus,

whence the finger of God is eminently discernible. There shall another mechanism be proposed, whereby the propulsion of fluids, in this big glandulous viscus, is fully demonstrate; and that is not only in the obscure vermicular motion that I just now insinuate to be in most vessels, but especially in the *Capsula Glissonii*, that acts the part of a longitudinal hollow muscle: by whose contraction the fluids are propelled through this viscus, here none can deny but there is a great deal of surprising wisdom seen in the frame of this viscus; for we see a viscus of this bulk and structure, should necessarily been a very sink for stagnationes if the foregoing mechanisms had not obviate and prevented it. Here by the way I crave liberty to desire any that finds fault with my insinuating the vessels and especially the veins to be longitudinal hollow muscles having an obscure vermicular motion, to answer why muscular contraction is generally attribute

bute to this capsular? is it not as probable that veins and some other vessels may have also a muscular contraction, especially since this capsula is called a vessel it self by *Glisson* in his Book *de Hepate* and since we find *Lower* assert the *vena cava* at its entrie into the right auricle to be muscular, why not other parts of it? Yea why not other Veins and other Vessels also muscular? But if any will not have this contraction called Vermicular, its all one to me how they call it if they will but grant it to be such a motion as is capable to assist in propelling fluids within their own cavities and pressing them into the patent mouths of other lateral ducts.

Next as we are to admire the mechanisme of this Viscus assisting for the percolation of its fluid through its Vessels; So no less admirable (tho not so palpable to view) is the cribrous glandular interstices interposed betwixt the importing and exporting Vessels. Here we may stand and admire where we cannot

not comprehend. could any thing but *Omnipotence*, produce such a Viscus whose texture is capable to secern from the Blood, by giving passage and transite through its glands to a fluid equally as gross if not more than that which it does not admitt or give passage to. For I suppose that bile will be litte if any thing short in the Crassness of its particles to the Blood recurring by the Cava, and yet the Bile passas while the Blood does not. Next from the consideration of the great many divisions and ramifications of Vessels (by which doubtless the particles of the Blood are further divided in order to the secernation of Bile, and many other curious things passed over in the structure of this Viscus, me may reasonably Tax the Athiest of Calloutness and Numbness of Soul, who will judge this or the like Viscus, could after an Infinite Jumbling of Atoms, been the result of a lucky Chance. Let these striplings of Reason or rather Monsters inteirly void of

of it, look impartially to this Structure, and ponder how its possible that such a curious Organ should be an effect of blind and dull Matter agitating it self. Nay rather let all confess it a product of His Hand, who is Wonderful in Power and Excellent in Working.

Of the Spleen.

THE next Apartment of this lower Story that comes in course is the Spleen, and its Structure and use is more obscure than any of the Viscera yet touched. My first promise of reducing all the Viscera either to Muscles or Glanduls, or composed of both, obliges me to prove it one of these, and its action either Commintion or Secernation or both, now as for the exact Anatomical Structure of this Viscus, the Learned *Malpigi* does give a satisfying Account, and for any thing ever I heard of the uses ascribed to it, I judge them mostly Conjectural, only in the general

general I think it may be said, the Blood deposite in its Cellulæ does certainly receive some alteration there: For sure Nature workes not in vain: But so far as I can find, its Structure is only a congeries of Cellulæ, in which Cellulæ are small Glands (as some think them) contain'd, and these membranous Cellulæ do receive Blood from the Arteries and again give out the same by the *Vena Splenica*. Now here is the difficulty whether this is a Muscle or a Glandule. When I consider it, it puts me almost to a stand: For if any of the Viscera could be called Vessicular Glands surely this would claim it with the first. But as I shewed my dislike with Vessicular Glands already, I shall not repeat it here. And I assert thir Cellulæ (or if ye please to call them Vessicles) to be Muscular. But it may be you will say, if these Cellulæ be Muscles what are the inner substances within them? I Answer, I think these may also be small Muscular Vessicles tho vastly less,

less, since we see it has hitherto been Natures way to have likeness and similitude betwixt the Viscus and its constituent parts, yea and to have the larger explicatory of the lesser, yea the whole Body of the Viscus it self to be explicatory of its minute constituent parts: as we see in the Pancreas, Liver &c. Yea and in the Muscular Viscera. This is clear also, if we consider that every particular constituting Fibre hath a particular contraction, and hence may be lookt upon as a particular distinct Muscle. Now I judge all our difficulty will be to prove the Cellulæ Muscular, and for this I say, this Viscus has nothing to press forward its contained Fluids that I can conceive, but only the progressive motion of the Fluid it self, which ceases, or at least would be much interrupted when deposite in the Cellulæ, and could hardly again be propelled into the Vein, if these Vesicles or Celluls had not either a positive Muscular contraction, whereby the
Fluids

Fluids are expelled wholly, or at least an Elastical motion whereby when they are filled beyond their spring they refile to their alloted dimension. So the Fluids contained are partly ejected though not so much as would by a positive Muscular contraction, yet this is enough to hinder total stagnation in the Cellulæ.

Now another reason that induces me to think thir Cellulæ are Muscular is the Muscnlar Fibres, that constitute them which are very discernable. Then you may observe that I did not positively say, their contained small substances within the Celluls were Muscular: But only proposed it as probable, so I will not say but they may be Cribrous Glands secrening a Glandulous Juice which they deposite probably into the Cellulæ for further attenuation of the Blood contained in them. And thus our Viscus will be partly Glandular and partly Muscular, but in regaird the Structure of those small Bodies

Bodies is very uncertain, their parts being so minute, we cannot be positive about them, only we find when cut they fold into themselves, and this would make the former insinuation of them appear somewhat probable; to witt, that they may be Muscular Vesicles like the other though vastly smaller, and they may receive a part of the Blood for its further preparation, and deposite the same again, either in the Cellulæ immediatly, or by some small excretory or venal Duct: For I judge that the Blood is further divided in the Muscular Cellulæ; its molleculæ by their contractions being rendered smaller, and more subtiliz'd: Or at least its crudling grumi are broken, and hence its mass rendered more Fluxile, and if the inner substances be granted to be Muscular (as I have shewed it highly rational to alledge) then doubtless they do the same, and so the sole use of the Viscus will be comminution, and that it does by means of Muscular contraction,

on, and so it will be noways secretory to the Blood.

Now after this tedious and conjectural suppositions we shall reflect upon the Wisdom and Goodness discoverable in its structure, if we but think how a viscus of this form and make, neither haveing the Muscular motion, of contiguous Muscular Viscera, nor yet any contraction from its own external latera to propell its fluids, yet by its membranous Cellula contracting, or at least retelling its fluids, are not suffered to stagnate, but doe participate of the common circulation of whole Mass. Now if these cellula had not been capable of contraction, the Viscus would have extended to a prodigious bulk, for the cellula being deprived of their contractive or retelling functions will certainly (alwayes receiving and not expelling) amplify hugely. I remember I helped to dissect one who had a Spleen amplified to a vast bulk, if my memory serve me right it weighed Eight pounds

pounds and some odd Ounces, the patient before death had his Belly very big, and he was reputed Hydropick, till a prodigious Spleen undeceived the Spectators: this Spleen when cutt was just like clotted Blood covered with a Membrane, and no doubt it had its rise by the Cellulæ having losed their contractive vis. Now that this does not alwayes fall out its to be impute to the great Wisdom and goodness of God, who has so framed this Viscus as to render it capable by the contractions of its Cellulæ to prevent the stagnation of Blood in them.

Next its observable, that if it were not wonderfully fibrous its Cellulæ (of their own nature separable from one another) could not adhere; its outer membrane being also very slender: hence perhaps the accounts (that *Cabrollius Marchet* and *Fallopious* gives us of sundry Spleens in one person) may proceed. From all which, we may see that those Viscera that some account superfluous, and

and few know well their real use, may give ground to praise the Author of their curious structure, and we may admire what we do not perfectly understand. Lastly its situation argues Wisdom which is, where it can sustain least hazard from hard and ponderous Bodies. This I could enlarge upon; but I go on to the next apartments of this lower story, and they are double being on either side one. And these are the Reins.

Of the Reins.

THE Reins which the ingenious *Bellini* did first discover to be of a quite different structure then formerly they were reputed to be, the said ingenious Gentleman did find that the large substance of the Reins (formerly reputed to be parenchymatous or I know not what) was really a congeries of Vessels or small canaliculi by which the Urine passed, this by him

was

was brought but to a rude draught till the accurate *Malpighius* did give it a compleating stroke, not only by fully explaining the Urinary Canaliculi : But by discovering a vast many cribrous Glands interposing betwixt the Extremities of the Arteries and the foresaid canaliculi, so that this viscus I judge may be called a composed Glandular viscus composed both of cribrous and Vascular Glands : So that *Bellini's* canaliculi as they are excretorial of *Malpighius* cribrous Glands, so they are Vesicular Glands being the same to the cribrous that the medular part of the brain is to the cortical. So first the Arteries enter and depositeing the Blood in the cribrous Glands, the serous part Secerned by them is transmitt by the Urinary Canaliculi to the pelvis: the recurrent Blood returning from the cribrous (not being admitted by them) is sent by the emulgent Veins to the Cava.

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Now

Now since its evident that these are a mixt sort of Glands partly cribrous partly vascular, and the Excretories of both are the Ureters and Bleddar they being the same to them that the Nerves are to the brains cortical and medular substances, its clear their Action is Secernation here: But the great difficulty is how this Fluid should so quickly pass, So Atheists may say why is those wonderful mechanisms (so fondly talkt of in other Viscera) wanting here where it is so very needful to prevent stagnations in their so impervious like Urinary Canals, I answer, Serum is a Fluid not obnoxious to stagnation as Blood is, its particles being more disunite, and not having such tendency to union and coherence among themselves as these of Blood have, and therefore have not such need of Muscular propulsion, and other such Mechanisms as others have: And next the situation of thir Viscera where: by they may have some obscure motion

on communicat to their fluids partly by the erections and curvations of the back, and partly by the motions of the diaphragm, which last though it may not reach them: yet its conection to the superjacent membrans on the back under which they ly and to which they adhere, does certainly confer some obscure motion, which if it were no more then a tremulous concussion in a so thin and easily moved fluid, may be much assisting. Then it may be the membrane investing them may give some small help in this matter. And lastly, to silence all cavilling Atheists I judge their position is such as does answer the design more then all, for these urinary canaliculi by the position of the Reins (upon the plain they ly on) with their periphereis inclining upward; are so disposed that their Course toward the pelvis (toward which they run as to a common center) is descending for they arise from the cribrous Glands in the peripheri, so that the Fluid of Serum

in them, has a descent: and hence its own gravity and fluidity may in some measure facilitate its way and accelerate its course, and thence together with the former obscure motions I shewed them to have may sufficiently force forward this so easily moved fluid, yea hence stagnating sand and particles of small stones by means of these former agitations and concussions may be forced to the pelvis. From all which it will be evident that this Viscus has sufficient Mechanisms to prevent stagnations yea to accelerate the transite of the Serum through its canalls: But if after all some obstinate Atheist should say since it was so necessary that there should be such a speedy transite for Serum (as the event shews) yea the short interruption of which transite would inevitably threaten the total subversion of the Animal OEconomy, why was such Viscera with such small and scarcely pervious passages having so little help from Muscular propulsion allotted for this end, since

since they seem most contrary to the design; I might answer this Atheist in the Prophets terms, how dare the Clay or thing formed say to the former why hast thou made me thus, but I shall answer this Fool according to his folly least he be wise in his own conceit, Say it were so (as it is not) that this Viscus were very unfit for the swift percolation of Serum because of its small passages and obscure help from Muscular propulsion, then since the event proves the thing let them adore the power that produces such effects from such improbable yea contrary-like means. Next I may answer him, if the Cribrous Glands, and Canalls composing the Vascular had been larger and the propulsion greater, then the Serum probably might have remained unseparated from the Mass and in place of fecerned Serum, there might have been a constant effusion of Blood, which as much threatens the subversion of the Animal O Economic as the interruption

doth, yea the smalness and minuteness of these Urinary Glands, doth the more commend the power and wit of their former. For as Mr. Rai Englishing Plinies sentences about insects, speaks whats applicable here, in greater Bodies, sayes he, the forge is easy, the matter being ductile and sequacious obedient to the hand and stroke of the Artificer apt to be drawn and moulded, into such shapes and machins even by clymsy fingers but in the formation of such diminutive things such nothings what cunning and curiosity what force and strength is requisite. And from all which it appears there is rather ground to admire the Wisdom Power and goodness of God who prevents our death for so long a terme of years, which our very make and frame seems every moment to threaten inevitably if it were not overruled by the wise conduct of that divine hand, who has possessed our Reins and covered us in our Mothers Womb, whose eyes did see our
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substance and in whose book our Members were write while as yet there was none of them.

Now let the reflection on the curious frame and structure of the Reins instruct us of the Being of that God who searches the heart and tryes the Reins I could much enlarge upon this Organ its frame and figure being such as most secures its small and tender canals from Ruption and Laceration, and in a passing way we may observe how the descending ureter does obliquely insert it self into the Bleddar, and the Bleddar it self I look upon as one of those Membranous Viscera that are also Muscular capable of an obscure Muscular contraction; and that this Viscus is Muscular is clear from the testimony of *Aquapendant*, and *Bartholine* who terms its middle tunicle *Musculus involvens* and if any will be strict in demanding a caput and cauda tendinosa I doe as in the Stomach please them with an outer and inner tendinous expansion

on separable from the Muscular Coat. Now this together with the Ureters and Pelvis may be lookt upon as the Excretories of the Glanduls of the Reins not regarding the expansion of this Vesica (as we did in the Vesica fellea) but as an enlarged part of the Excretory, not only for the conveniency of retaining the Urine for some time but it may be that it may be explicatory of the structure of the Pelvis Ureters &c. Here we may observe the goodness of our Maker that fits us with such parts as not only suit our Organs but our conveniency and ease, if this receptacle had not been for receiving and keeping Urine for some time, how much should we have been incommoded by a continual dropping of Urine. Next if this Viscus had not been Muscular we should have laboured alwayes of an inevitable *iscuria* which necessarily would have been the prælude of a speedy dissolution. Lastly, I may add, if this Viscus had not got a considerable Muscular

cular Sphincter, not only we might have had an involuntary emission of urine, but none could have been freed of the Stone by cutting, which would have been a lamentable misery to a great part of Mankind, so happily delivered of large tormenting Stones by being cut upon the Sphincter.

Of the Capsulæ Atrabiliariz.

SO I go on, and in my way I shall take notice of two little Glandulous Bodies, which for the similitudes sake we call *Museola*, contiguous to the two former Apartments of the Reinsthir are situate above the former. They were first observed by *Eustachius*; they are named by *Bartholine Capsulæ Atrabiliariz*; by *Julius Casserius*, *Renes succenturiati*; by *Wharton*, *Glandulæ ad plexum nervæum sitæ*. As Authors generally agree, that their structure is glandulous, so they as much disagree about their use. The most probable I find ascribed to them, is that of *Sylvius*, viz. That

That being situate by the wise contrivance of Nature above the Reins, they might fecern a Juice to restore and attenuate the recurring Blood that's turned Vappid and Crafs by the separation of Serum in the Reins, hence we fee the Goodness of God in this contrivance in preventing whatever might interupt the Circulation, for furely this Blood, that was to afcend upwards, its own gravity might be interrupting enough in the motion, efpecially being deprived of its thinner part, by which it was rendered lefs Fluxile, confequently more obnoxious to coagulation, if this had not been prevented by the accefs of this new Fluid (from thir little Glands) whereby its not only more attenuate, but rendered more generous and active, and hence more fit for circulation.

The next thing in this lower ftory of our Building that occurs in courfe, is the Organs of Generation of both Sexes, but in regard in the Male the cheif of
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these *viz.* The Testicles, are without my reach, being out without the great Cavities, for I understand by Viscera, such as are contained in the great Cavities. I could easily prove them Vascular Glands, and shew their Action to be Secernation, but what is extraneous to my purpose I pass over. The next thing that comes in course, is some of these Organs in the Female *viz.* The *Ovarium* and *Vterus*.

Of the Ovarium.

NOW the *Ovarium* one would think at the first view belongs to the Category of Glands in regard it seems most to resemble Vesicular Glands, which contains a sort of Crass Fluid, and then their excretory Ducts would have been the *Tubæ Fallopiæ*. But since I shewed my dislike with Vesicular Glands already, I shall still be of the same mind. And though I acknowledge that there is in the *Ovarium*, an
unusual

unusual and unaccountable structure to which there is scarce any likeness in all the Body, however I judge they are Muscular Vesicles, having either an evident Muscular contraction, or at least some obscure elastical motion, by which they reseile after being expanded beyond the dimensions, that their spring admitts, and by one of thir two ways they expel the within contained *ova*, through the *foramina*, in the middle of each of the Vesicles, by *De Graaf* called *papillæ*. Now this Muscular contraction, or elastical recoiling, (so to expresse it) may be occasioned by the admission of the Spirituous part of the *semen*; Or if ye please by the reception of the *animalculum* (*in sperma virili existentem*) extending or expanding the Ovum, so as it occupies more space, thence, produces its own expulsion through the forementioned *papillæ* by the contraction of the Muscular Vesicles. Next this Hypothesis of the several Vesicles being Muscular seems to be rendered

rendered a little more probable by *Malpigi* his Answer to *De Graaf*, writing on this subject, as *De Graaf* himself relates it, *Non ita pridem* (says *De Graaf*) *per literas a me consultus, Malpigi* *ex fibris carnis circa ipsa ovaria* *fœminarum reperiendis separationis causas* *petendas rescripsit.* I might add more reasons enforcing the probability of this Hypothesis but I stay not here. Now these Globolous Bodies expelled out of the Ovarium, are received by the *Tubæ Fallopianæ* which are evidently Muscular Ducts, they deposite the same Ova into the Cavity of the Uterus, where the Embrio is encreased to a Fœtus, and the Fœus is compleated and extended in all its parts.

Of the Uterus.

THIS Natural Matrafs is situate as in a balneum betwixt the *Fæces* of the *intestinum rectum* & urine in the Bladdar, hence one says well *Quid ergo* *super.*

Superbimus qui inter stercus & urinam nascitur. Now it remains that I shew

this Viscus to be either Muscular or Glandular or both; So I judge this Viscus is like the Stomach, partly Muscular and partly Glandular, which the Anatomy of the part evinces. My next work is to reflect upon this Viscus as to its Structure, Situation and Figure, all which, is such, as render it most capable of Cherishing Containing and Exite giving to the Embrio, Foetus and Child, in which several states it fully suits its condition, and according to the gradual Growth of the Child, the Dimensions of its Domicile are amplified gradually, now this is an evidence of the Wisdom of that God, whose Ways are not as our Ways, nor His Thoughts as our Thoughts.

A 2^d, Evidence of the same Power and Wisdom, is its Thickening in the in time of Gestation, when by the ordinary courtes of 2^d causes as it distends and amplyfies, its substance should be-
come

come thinner, but to remark every thing that argues Wisdom and contrivance about this Viscus, would exceed the bounds we can allow, so that to say no more, I judge *Suamerdame* in treating on the Uterus, does affix a very apposite Title to it, when he calls it *Miraculum Natura*, nay here we may read the Vestiges of him who took us out of the Womb, and made us hope upon the Breasts of our Mother, from whom our substance was not hid, when made in secret and curiously wrought in the lower parts of the Earth.

Now I leave this lower Story, and being led by the venal Ducts of the Uterus to the Cava, by which into the Heart, the first and cheif Apartment of the 2d story.

Of the Heart.

NOW as in the rest so in this I am bound to prove it either Muscular or glandular or mixt of both: But this
Viscus

Viscus seems truly one of these that are solely Muscular (for I regard not its lympheducts) and both much cominutory and expulsoy of its fluid of Blood hence it has the strongest Muscular Fabrick of all the Viscera; I need not stay to prove it a Muscle it being universally agreed on: And *Hippocrat* of old and *Steno* and *Lower* of late have rendered it equal to ademonstration therefore I have little to do in this: only to make reflection upon the Mechanisme of this Viscus, since it seems to to be appropriate for dividing vigorating and restoring the languishing and vappid Blood both as to its motion and consistence this recurring fluid being much deprived both of its fluxile and active particles, is in a tendency to Grounnosity which the Hearts contraction and the admixture of what fluids it gets from the glands does much prevent. Now that this Viscus is the most adapted for these ends is evident in its having cavities and those

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Muscular capable both to receive, mix, grind, and violently expell its fluids; hence the Wisdom and goodness of God is evident in the frame of this Viscus, that when retireing and languishing Life demands seasonable recruite and help, since a Muscular fabrick like the ordinary Viscera could not effectuate the abovementioned ends then he will deviate from the common course of nature, and afford a Viscus consisting of four Muscles all which receive and expell the same Fluids, and have a proportional congruity both as to their bulk and contractions the Systoles of the Auricles keeping time proportionally with the diastoles of the Ventricles and e contra.

The next thing observable in the Mechanism of this Viscus is the Valves being so framed as to admit the Bloods ingress but hindering its egress by the same way it entered as also admitting its egress but hindering its regress by the same way it went out; and

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here

here by the way, we may observe the strange Mechanisme for promoting an uninterrupted circulation in the form and figure of Vessels as the Arteries are conical Bodies that from a broad basis do gradually lessen their Diameter toward their extremity and hence their figure might render the Fluids passing them more obnoxious to stagnations and slowness of motion then Cylindrical or coninvolved figures would, and to evite this inconveniency they have their Pulls or evident Muscular contractions on the other hand the Veins being deprived of these considerable pulsations by the evident Muscular contractions the former have (whatever vermicular obscure motions may be allowed them) their Fluids passing them would infallibly stagnate, if the Wisdom of God had not prevented this by allowing the Veins and other Vessels too, a quite contrary figure to the Arteries. So that from a small Diameter they gradually widen and enlarge their Diameter

ameter which coninverted figure (if I may so exprefs it) does greatly prevent Stagnation and promotes the circulation of the Vascular Fluids and consequently Life it self, for the circulation of the Blood and Fluids of the Body is natural Life it self. Now I think these are sufficiently demonstrative of counsel and contrivance, So that an Atheist cannot but see the finger of God to be here. I might also enlarge upon the septum pericardium and coronary Vessels &c, all which if reflected upon might afford arguments wholly subversive of Atheism, but that we exceed not the bounds allotted, I Conclude, *Wishing that every heart were enditing good matter, and (touching the King) that every Tongue were the pen of a ready Writer.*

Of the Lungs.

THE next apartment of this second story of our building is the
F 2
Lungs

Lungs. Our business is to prove this Viscus Muscular or Glandular and its action either comminutory or secernatory, I stay not upon the Anatomical structure that *Willis*, *Thruston*, *Malpigi* and others have done at large, so I assert these multitude of Vessicles composing this Viscus (so diligently described by the Laborious *Malpigi*) to be each of them Muscular and to have Fibres, whereby they dilate and expand in the reception, and contract for the expulsion of the Air. Its true I incline to think the motion of thir Vessicles to be rather that sort of Muscular motion we called Elastical whereby I conceive these Vessicles to receive the Air insinuating it self by its pressure and gravity within their Cavities, and they by this Elastick Fluid, being expanded to such a determinate width as their spring allowes, does when dilated beyond their allotted dimension, recoil and resile; by which recoiling and resileing they expell the contained Air, or
at

at least most of it, but this being only my own opinion, I do but assert as such and I submit it to the Censure of others however it is they doe certainly dilate and contract for inspiring and expiring of the Air, and its very probable to think that though the external Muscles and diaphragm may be assisting, yet much depends upon the contraction & dilatation of the vesicles themselves, and since they cannot be denyed contraction and dilatation how should they doe these unless they be Muscular, for I judge nothing capable of contraction and dilatation after this manure, but what is a Muscular substance as these vesicles must be, and that these are Muscular is evidently asserted by *Willis* in these words *Cellulae istae vesiculares* (says he) *ut nixos pro expiratione contractivos edant etiam fibras uti per microscopium plane conspiceret musculare obtinent.* Next you will (I judge) think me obliged to prove them comminutory to the Blood since many Anatomists

assign them that work particularly *Malpigi*us says their use is *Sanguinis varias partes unire, miscere & quasi subigere*, this is indeed not so easy to prove, for if the Blood did occupy the place of the Air, we might more readily alledge this, but how they can be *Comminutory* to the Blood, that never enters their Cavities, nor can we almost understand any communication betwixt them, for I see not how the Air has access to the Blood since we find neither Vesicles nor Vessels are perforate) nor yet how the Vesicles containing the Air have access to act upon the Blood ; So how to prove the Vesicles, and Air contained in them *comminutory* to the Blood, I scarce see, but if place be allowed for conjecture, I judge considering the Structure of the Lungs and their Vesicles and the many small ramifications of the Arteria and Vena Pulmonaris, I judge that these Ramifications may pass betwixt the Vesicles, so as to have the
Vesicles

Vesicles pressing them on either side, the Air by its Elasticity expanding the Aerial Vesicles, which expanded Vesicles pressing on against the other and the Vessels, containing the Blood being betwixt them are pressed, so as the contained Fluid in the Vessels is violently squeezed betwixt the Vesicles (the violence of this pressure will be evident to any that are acquaint with the Airs Elasticity how greatly it will expand it self, especially when freed from External Pressure) this I was induced to think, when I saw such Ramifications of Vessels through the substance of the Lungs, I also judge this pressure of the Air in the Vesicles upon the Vessels and contained Blood, may accelerate the progressive motion of the Blood, by propelling it forward in these Canals; but whether these things be so or not, this is one thing sure, that the Air is of great use in Natural life, since we cannot be a small time depriv'd of it, without being also depriv'd

priv'd of life it self, so that nothing is more common then Inspire to denote a giving Life, and Expire to signify Death, now I think my next work will be to reflect upon the Structure of this Viscus, which is such as is most capable, to receive and expell Air, of all the Viscera we have gone through, though they were all very fitly Adapted for the uses to which by the Wisdom of Nature they were Assigned, yet none of them could have suited the design of Respiration, but this only. Then next, they are so curiously framed as to have communication one with another, and are so disposed as they can containe the Air conveniently and expel it easily, where by the way we may observe that the Bronchæ has a certain springyness, (they being Cartilaginous) whence they give Readyer Ingress and Egress to the Air, and lengthen and abbreviate as the Lungs dilate and contract and according to *Willis* the trachea hath a Muscular, Vascular and Glandular

lar coat and the same may be said of the Bronchæ which is its continuation, and of the Vesiculæ which according to *Malpigi* and *Willis* both, are a further continuation of the former, what ever may be said of their Vascular and Glandular Coat, I am sure a Muscular must be allowed them and this will fully Answer our Hypothesis as to the Vesicles contracting and dilating for receiving and expelling the Air. From all this we may see the Wisdom and Goodness of that God, who giveth to all life and Breath, and all things, yea He has left such instances of His Care to prevent our Misery, that where recurring and languishing Blood threatened stagnation, He not only speedily affords attenuating Glandular Fluids within the Body, but even commands succour from the Atmosphere, that might divide the Groumus and Coagulating Blood. Hence we see what reason Men have to Praise and Fear that God, that Breathed in him the breath of Life, who

who when He takes away their Breath they die, and return to their Dust, then let us admire the tender care and compassion of this Great and Good God, in whom we Live Move and have our Being.

Now by the Annular steps of the Trachea, as by Staires (to speak so that we may adhere to our former simile) we ascend to the 3^d and upper story of our Building.

Of the Brain.

HERE I shall not insist upon the Anatomical Description of this Viscus, or enquire into the curious Questions moved by Authors, about its Structure and Actions. I shall only satisfy what I undertook at first, to wit to prove it either Muscular or Glandular, and its Action, either Comminution or Secernation, so with *Hypocrate* I assert the Brain to be a Glandular Viscus secerning Animal-Spirits, by the Excretories

cretories of the Nerves or rather that it a Viscus composed of two different kinds of Glands, to wit the Cortical one kind, and the Medular another. Now we see there is great difference betwixt the Cortical part, and the Corpus Callosum or Medular part, hence *Willis* makes the Medular Excretoical to the Cortical, which he calls Glandular; But as I have observed a great deal of uniformity and likeness in the Works of Nature throughout the whole Viscera, both in their Structure and Operations, so I conceive there may be something here in this Viscus, which not only demonstrates the Oneness and Sameness of Nature, but discovers the Brains being Explicatory of the two kinds of Glands constituting all the Glandular Viscera. For as the Heart, the cheif Muscular Viscus did give some faint discovery of the two kinds of Muscles that I told was in the Body. *viz.* By its Cavities representing hollow Muscles, and by its thick Muscular

ar substance, the external Muscles or
 Muscles not Cave (I as presum'd to call
 them, for the difficulty of fit words to
 express thir things, makes the Discourse
 anent them harsh and unpleasant)
 Now I say as the Heart the cheif
 Muscular Viscus, represents those two
 kinds of Muscles, so the Brain the cheif
 Glandular Viscus, does by its Cortical
 part represent the Cribrous Glands
 (for I conceive the Cortical part of the
 Brain to be really Cribrous Glands)
 and by its Medular part, it represents
 the Vascular Glands, and this last can-
 not be denied to be a congeries of
 Canaliculi by all that have been at
 pains to veiw them with a Microscope,
 now the Cerebel and Medulla *oblongata*
 having both of them their Cortical and
 Medular parts, I look on them as sub-
 stances of the same Nature, so both the
 Cortical and Medular parts do jointly
 Act in produceing that most subtile
 Fluid from the Blood called Animal-
 Spirit, and the Cribrous Glands of the
 Cortical

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Cortical part, seems to fecern what the Medular by its Serpentine Ducts purifies and Subtilizes, for we find always that Spirit best *defecate* purest and freeest of Body, that passes the most serpentine windings. So you see I conceive the Cribrous Glands of the Cortical part to fecern from the Blood the Animal-Spirits, which the Vascular Glands of the Medular Subtilizes, refines and further un-Bodies, thereafter they are received by the Nerves the Excretories of both. Now those particular conjectures I only propose as probable, submitting them to Censure; not imposing them on any as positive Anatomical Truths, only as Rational Probabilities: But now I go on to the reflection upon the Frame and Structure of this Viscus, and if any Atheist should demand the Mechanisme of this Viscus for the propulsion of its Fluid, since its highly unreasonable (may he say) that a Viscus of this bulk consisting of such impervious like can-

nuls

nuls should be destitute of the Mechanisme of muscular propulsion, I answer let the Atheists know, there is no want of what is necessary to propel this subtile fluid through these small and serpentine windings. For first every fluid is propulsive to itself when excited or put in motion by any mediate or immediate cause. Next Spirits suppose easy motion; the more subtile any matter be it is the more easily moved. 3^{ly} its not a fluid capable of Coagulation as the Blood and other crass ramose fluids are, so needs not much propulsion, then the situation of the Viscus its canaliculi being depending with a descending course so that the fluid contain'd be it never so subtile matter (while matter) has a certain degree of gravity and hence must be facilitate in its motion downwards. but this last has place mostly in Animals that as the Poet speaks *Os Sublime dedit Cælum Solumque tueri*. Lastly I may justly think that the meninges are not destitute of some

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some obscure Muscular contraction, since we see they, especially the *Dura Mater* is positively asserted by *Willis* to have Muscular fibres and to contract and dilate, and the same thing may be said of the *Pia Meninx* that particularly invests these small passages: But suppose they were not Muscular what is added beside, is sufficient for the propulsion of this so easily moved fluid. hence we see it highly unreasonable in the Atheist to quarrel the want of Mechanism for propulsion to the fluids of this Viscus. Next if the Atheist should object that those Cribrous small glands and impervious cannuls are not only vastly minute and small but so slender and numerous that scarce any small Jolt or concussion can befall our Bodies then also soon either it cuts the thread of Life or at least so disorders the Body that it lives ill; Hence from a little obstruction or inflammation of these parts by such slight causes the Body becomes *Apoplectick*, *Epileptick* *Maniack* or the like;

like; Is there ground (could the Atheist say) to admire Wisdom and goodness here, in giving Organs that are so easily disordered, and that upon the smallest disorder does inevitably procure death or what is no less undesirable, this seems (would he say) to be reflective upon your God and derogatorie from his essential perfections of Wisdom and Goodness so much talkt about. I answer since the Atheist alleges the enuity and slenderness of the Organs renders the Body upon the smallest external cause or Jolt obnoxious to death, an *Apoplexy Mania* and the like, I answer its a pity all Atheists have not this fatal Jolt with their first breath next its no wonder he fear a *Mania* for all such are incurably Maniack or rather Demoniac, but that I may answer him more nearly I say its false that by small external Jolts and the like Men are obnoxious to death, we see God in his goodness to us has not only prevented external ills from slight causes

causes by giving the Meninges to fix the brain in its natural Seat and defend it there, but has given the strong safeguard of an Osserous Helmet, exactly suiting the forme and bulk of the Viscus, to which its firmly adherent, in several places and by means of the *Dura mater* its closely connected there-to on all sides. Next its false that such smal external causes and disorders does so easily procure Death that upon slight external jolts its alwayes *prefores* as it were, then none could arrive to old Age, yea we see our mean and Servile People that are mostly obnoxious to external ills live to greatest age. And lastly grant all were so that upon such smal causes we were expos'd to the danger of Death and illness, It does the more commend the power and goodness of God that preserves his so brittle Creatures for so long a season, and prolongs his life to a great many Years, that his very make and frame (*ex concessis*) (or rather what his sin has procur-

ed in distempering his frame) did threaten and tend to every moment of his Life. And then in the next place did we ever pretend that Man should be independent of his God even as to the structure and frame of his Body, then we should Act injuriously to God in depriving him of the Glory due to him in preventing our pains and healing our diseases. And lastly from the minuteness and slenderness of of these Organs the Atheist can have no argument for (as I somewhere else hinted) the more minute and slender these parts are the more the power of the Author is discovered not only in makeing them such smal nothings but in producing such huge effects by them hence *Plinys* saying may be most fitly repeated here *in magnis siquidem corporibus* (sayes he) *facilis officina sequaci materia fuit, in his tam parvis atque tam nullis que ratio Quanta vis? Quam inextrecabilis perfectio?* And again he adds *Rerum natura nusquam magis quam in minutis*

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naturis tota est. Hence we see from all this its not only false that this Viscus wants Mechanism sufficient for what Propulsion its fluid needs, but likewise that its also false, that slight external ills does inevitably procure Death and Illness. And lastly, that its equally false as the two former that the slenderness and tenuity of the parts composing the Viscus are any way derogatory from the Wisdom Power and Goodness of God : But rather exalts and magnifies those his Attributes all which I think is evident from what is said.

Now from the whole Premisses I judge its more than evident that those who make it their work to introduce Atheism, as they are totally abandoned to a callousness and numbness of Soul So of such none can be accounted Anatomists whatever they pretend, for while the eyes of their Reason are not blinded and they not given up of God to beleive a Lie ; It is impossible for

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them

them so to veil and blurr these indelible Characters of Divinity impressed on every part of the Body with the finger of the never enough exalted JEHOVAH who is Glorious in power, and wonderful in Working.

But before I conclude this discourse I shall obviate an objection that may be made which is this, some may suppose, from all you have said you have nothing satisfied the Objections against Christianity and revealed Religion. Your endeavouring to prove the Existence, Wisdom, Power and Goodness of God from the Frame and Make of Human Bodies, does in some measure check the Athiest and cultivate natural Religion; All which may be done by an Enemy to reveal'd Religion: yea we see it the cunning of Deists to insist upon this Topick more now than ever, that they may withdraw Mens mind from Revelation, so that you may not be reputed of that hellish number, those monsters of Mankind, that deride the Scriptures,

ptures, and mock at Christianity, you would satisfy this objection.

To this I answer as its the Work of an Anatomist *qua* Anatomist to cultivate natural Religion only (and in this he is as it were the High Priest of the Creation, in things natural; Which is clear, from his being conversant, about the most noble subject: And hence he offers a more excellent Sacrifice of Praise, than other Puny Naturalists, taken up about inanimate Bodies) Yet its the work of one thats Christian, to adhere to and owne both Natural and Revealed Religion. And though I am unwilling to put my sickle in another's harvest; Yet, that I may answer this Objection, and that I give not offence to the meanest in the Church of God, I shall say further, That as from the Premisses the Being and other Perfections of God (and thence natural Religion) are proven from a necessity of existence, so I judge the Verity of the Scriptures and reveal'd Religion

are deduceible from the same Premisses by a necessity of consequence, and this I shall endeavour to evince thus.

I say since it hath been proven, that the curious frame and structure of the Viscera are abundantly demonstrative of the existence of God and declarative of his Almighty Power Infinite Wisdom and Goodness and further that he is Graciously Communicable to his rational Creatures in revealing himself and his will to them thence it will necessarily follow that this God is to admired revered and obeyed and by consequence has given Rules for his Worship and Obedience. Now that these Rules must be the Scriptures of Truth and can be no other, I shall endeavour to evince from a twofold plain Argument; first from the stile of the Scriptures themselves, they carry such Majesty of stile along with them, that I Judge none that hears and compares them with the most heroick lofty and eloquent flourishes of the greatest Orators

tors but will be made confess those to be
Infinitely short of the Scriptures nay to
bear no more resemblance, than the
thick Darknes with the Meridian
Light. But it may be some will reply, it
doth not so appear to them, and I will
not say, but this way of perception,
may be peculiar to favorites, and such
as attend them with a sacred regard,
for as there is a Joy, so there may be
a Knowledge, that the Stranger inter-
medles not with. But 2^{ly}. From the
Reasonableness of the Scriptures, their
being so agreeable to, and consonant
with, the Dictates of solide Reason;
and what of them is necessary to be
understood in order to Salvation, being
so fitly adapted, to our faculties, and
their fullness and perfection, being
such as nothing is defective as to the
Rules of duty in depending finite
Agents, toward an Infinit Depending
Author. And as to what regards the
Rational Creature's happiness, both in
Time and Eternity, These, I say, suf-
ficient-

ufficiently evince the Reasonableness of the Scriptures themselves; which together with the fullfilling of the several Prophecies and Promises, of the Scripture in the several periods of the Church both to the Church in general, and Believers in particular, and the admirable harmony betwixt the old and new Testament by the Mosaical OEconomy and legal administration being wholly Typical of the Evangelick, and that there is nothing nay not so much as one of the smallest of the ritual and ceremonial Washings but is some way illustrative and significative of something spiritual under the Evangelick OEconomy; I say, these, with multitudes of other things, that might be added from the Scripture's Perspicuity, Plainness and Suitableness to all Capacities, Circumstances and Necessities, Do sufficiently evince them to be of Divine Original and Authority, and to transcend all Humane Art and Wisdom and consequently must be

be the Rules revealed by God for man's conduct in his Worship and Obedience.

But to fortify doe but compare all other writings, that plead for, and pretend to Divine Inspiration, do they not easily discover themselves to be the delirious notions and absurd Dreams either of crasy brains or lying Enthusiasts the greatest pretenders to revelation and inspiration, do easily discover the cheat, when brought to the light of this Sun, which is as the Light of Seven Dayes, yea which grows more and more unto the perfite Day. What vast disparity is there betwixt the gross undigested and lame poetick fictions of the Ancient Learning, and this pure and unerring Word? Next, If we but view in a very transient way the absurd figments idle and empty speculations of other pretenders, they shall need no confutation, I shall only instance one that has deluded a great part of the foolish World, and that is *Machomets Alcoran*, I profess ingenuously, I never read such a
peice

peice of empty insipide and incoherent stuff, and for my part I cannot but blame those that name *Mahomet* the Grand Impostor, for sure none but Idiots and Fools can be imposed on after such sort, and the fault of the imposition is not in the Author but the on foolishly imposed on. But if I should goe through all pretenders separatly and a part, none should be found to bear any likeness to this solid substantial Divine supernatural and living word which as a two-edged Sword separates to the dividing asunder, betwixt the Marrow and Bone. Now since its proven from the *Idea* we have of God, that he is to be ador'd, rever'd and obey'd, and that he communicates his will to his People by certain Rules influenceive of their conduct, then it will follow, that we must fix on some revealed Truths, and if we shall examine the pretensions of all others we shall find them unworthy of reasonable Men and far more inconsistent with
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the *Idea* of an Infinitely wise God whose words must be Truth it self. Now since there is a necessity of centring on some Revealed Truth and the Scriptures being already proven to be beyond humane reach as to their original, nay far transcending bounded and limited understandings, it followes by consequence, those and no other must be the Truths revealed, and the word of God; And consequently all they reveal must be true: And therefore Christianity, and revealed Religion, true. Which is all I add to satisfy the forementioned Objection, and conclude begging pardon for my going without my own sphere; Hoping the weakness of my Arguments will not give occasion to any to think the less of the Truth I assert; It being wholly the business of a Theologue to speak on this subject, and therefor my reasons cannot be expected to be so cogent as those, dropping from the pen of one more acquainted with a theological way of argueing.

Bu.

But I desire to hope, That He who makes the Tongue of the Stammerer speak plainly, and perfites Praise by the mouths of Babes and Sucklings, will supply my Defects, and pardon my Weakness.

The

The Second Discourse.

Being

An Anatomical Explication of the first
six Verses of the 12 chap. of Ecclesiastes.

Verse 1st.

Remember now thy Creatour in the days
of thy youth, while the Evil
dayes come not, nor the years draw
nigh, when thou shalt say, I have no plea-
sure in them.

Verse 2. While the Sun, or the Light,
or the Moon, or the Stars be not darkned,
nor the Clouds return after the Rain.

Verse 3. In the day when the keep-
ers of the house shall tremble, and the
strong men shall bow themselves, and the
Grinders cease, because they are few, and
those that look out of the Windows be dark-
ned.

Verse 4. And

Verse 4. *And the doors shall be shut in the streets, when the sound of the grinding is low, and he shall rise up at the voice of the bird, and all the Daughters of Musick shall be brought low.*

Verse 5. *Also when they shall be afraid of that which is high, and fear shall be in the way, and the Almond Tree shall flourish, and the Grasshopper shall be a burden, and desire shall fail: because man goeth to his long home, and the Monrners goe about the streets.*

Verse 6. *Or ever the Silver cord be loosed, or the Golden Boul be broken, or the Pitcher be broken at the fountaine, or the wheel broken at the cistern.*

THE Preacher does here by way of Epilogue to this Book shut up all with meditations on mans frailty, and as Naturalists say of the Swan, its melody is sweetest at its latter end; So its here, and though this Elegiack Song be Melancholick, yet melodious

ludious, here he addresses himself to the youth, as these that usually are most reluctant to give ear to such advice as interrupt their Joyes, and draws a veil over all their Pleasures, and therefore the redoubled Expressions have oft a weighty Emphasis, denoting fervency in the Speaker, and no less obstinacy in the Hearer, the first Verse being properly the work of a Theologue, and noways Anatomical, I pass it, and shall begin with the second.

While the Sun, or the Light or the Moon or the Stars be not darkened, nor the Clouds return after the rain. This Preacher of Wisdom, describing the Frailties and Infirmities of approaching old Age and Death in which it Terminates, does begin with the defect of Sight, they being the ordinary forerunners that sound the approach of other Maladies, incident to this state.

Arius Montanus reads the 2d, verse *Donet non (vel antequam)* as *Piscator Castalio*

Castalio and others has it) *Obtenebescat Sol & lux & luna & stella & revertantur nubes post pluviam*, so the words will run, *before the Sun or the Light &c. be darkened*: But this is not so much the work of an Anatomist, to play the Critick upon the several versions of the Text, but rather to stick to our own Version and explain it Anatomically, however to shew the harmony and coincidence of the versions (whereby is not a little Illustrate the Sense and Scope of the Text) I shall with as much brevity and plainness as I can touch them transiently, and thereafter give you my own shallow and lame thoughts of their meaning, in a word or two.

Some would have this 2d Verse to regard the *Babylonish Captivity*, Others the *Apostacy of the latter times*, but with this I shall not spend time. By the Sun, the Light, Moon and Stars, some understand these Luminaries Literally, intimating the Infirmary of Sight in
old

old People, to whom all Lucide Bodies appear obscurely. Others think the *Soul and its Faculties are meant*, particularly *Doctor Patrick* a very ingenious Gentleman, in the general says, he thinks an universal decay of the whole Frame of Nature is meant, then more particularly by the *Sun*, he says may be understood, the *Soul*, by the *Light* the *Understanding*, by the *Moon* the *Will*, by the *Stars* the *Notions* of the *Mind* and *Memory*. All which decay or are darkened at Death. *Doctor Smith* seems to think both the *Faculties of the Soul*, and *Parts of the Body*, to be meant by *Sun*, *Moon* and *Stars*, both thir Gentlemen and others also, neglect the *Literal Sense of the words*, because of what follows in the 3d Verse, and hence to evite a Tautology (as they think) make the words figurative and to mean otherways then they sound. The *Chaldee Paraphrase* applyes them wholly to Bodily Organs; particularly makes them wholly regard the countenance

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and hence Paraphrases the Text *Antequam materis Splendor Gloriam faciei tue, quæ assimilatur Soli, & Lumen oculorum antequam obcæsetur, & decus maxillarum tuarum antequam obcænebretur, & papillæ oculorum tuorum, quæ assimilantur stellis, antequam exstinguantur*: But I see not why the External Luminaries may not be understood here, as also the eyes spoke of Verse 34 and yet no Tautology, for there is two very different things adduced and spoke of for the representation, and since we see often several words made use of, to hold forth and represent one thing, why not doubled Sentences, representing the Debility of one and the same Organ, especially it being expressed (as is said) by very different representations.

So by this Sentence, while the Sun, Light, Moon, and Stars be not darkened, I judge is meant, before these fixed and Planetary Bodies be obscured, that is before the Lucide, or rather light emitting and reflecting Bodies, appear so to us.

For

For the appearing obscurity of such Bodies, are for the most part inseparable concomitants of this declining State, and so they must be, since in this partakme of Human Perfection, the Organs of Sight, are rendered more unfit to receive and refract the emitted rayes, hence the Images of the Objects are more obscure, than they were in *Statu juventutis & vigoris*: But more of this in the 3d Verse. By *clouds returning after the rain*, Simon Patrick thinks is meant, one trouble treading upon the heels of another, that is there is a succession of miseries and greifs.

But I choise rather to think, that by *the clouds returning after the rain*, he is either farther enlarging upon the obscurity of Lucide Bodies just now spoke of, *clouds and rain* being the usual Meteors obtenebrating the Natural Heavens, or by this he may allude to the Rheums and Tears incident to this declining State, as the *Chaldee Paraphrase* seems to insinuate, while it has *palpe-*

*bra oculorum tuorum stillabunt lachrimas
ut nubes post pluviam.*

Verse 3d *In the day when the keepers of
the house shall tremble &c.* Arias Monta-
nus Translates it, *In die qua commove-
bunt se custodes domus*, the vulgar La-
tine I think has it *Agitabunt se* or *com-
morebuntur custodes*, the Chaldee Para-
phrase renders both Sentences, viz.
this and the following *contremiscant
coxa tua, & concutientur brachia tua*, but
here it seems evident, the keepers of the
house to be the Arms and Hands, those
being given of God for Defence and
Safety, and they usually tremble when
Death and Old Age approaches. And the
strong men bow themselves. Arias Monta-
nus has it, *Pervertentur viri virtutis*,
Piscator has it, *Incurvabunt sese viri ro-
busti*, the Vulgar Latine and Castalia
renders the word (*hithgnavelhu*) *nu-
tabunt*, shall nodd or shake. And the
Septuagint has it *Percussi fuerint*. Others
have it *Distorquebantur*, Others *Vacilla-
bunt, retrocedunt, concutiuntur &c.* Some
render

render strong men, *Viri roboris*, men of strength, Others have it *Robustissime fortes vel valentes robore*, the Seventie have *Viri potentia* or *Fortitudinis*, but here surely the Legs and Thighs must be meant.

The Grinders cease because few &c. Arias Montanus has it, *Cessabunt molares quia diminuerunt*, Others *Quia desinunt sciz moleri*, some as *Piscator* renders the word (*Mignetu*) *intermittunt*, Others *Deficient*, some have the Sentence *Quia inutiles facti fuerunt*, I judge here is understood the Teeth, that are said to cease, either by losing their grinding force, or said to cease because few, when they moulder away, peice-meal or fall out of their sockets, which is most usual to superannuated People. And those that look out at the windows be darkened &c. Arias Montanus reads it *Et tenebrescent videntes in fenestris*, the Seventy read the sentence, *contenebrescent qui vident in foraminibus*, which may fitly agree to the Orbits. The Ara-

hick Version (if I right remember) read it *Per foramina*. Junius and Tremellius have it *Per speculas*, Piscator and some others have it, *Per fenestras*, the Chaldee Paraphrase has the whole sentence *Et caligabunt oculi tui qui vident per cancellos capitis tui*, Castalia has it *Caligabunt spectantes per meatus*. Now those that look out at the windows being darkened, are evident to be the Eyes which look out at the window-like Orbits and Eye-lids. But how in this retiring state, the Eyes are darkened, is to be made appear they may be darkened, or represent the Images of the Objects to the Soul obscurely, several ways, some of which as being most incident to declining and retiring Nature, we shall instance, and those have solely their Origine, from vitiate Organs for the Rayes of Light, proceeding from the Lucide Bodies being the same, and the Soul no less capable to judge and discern the various objects represented in old Age,

as

as in vigorous Years, hence the obscurity must necessarily proceed from vitiate Organs, those defects of the Organs of Sight, being the ordinary preludes of approaching Death, as it were sent by the Wise Author of Nature, to sound the Alarm of Departure to dying Man, and certify him of the approaching Fall, of his towering Fabrick.

I shall only give one instance wherein the objects are known to be obscurely represented, and its this, When the visive Rayes are not rightly refracted and transmitted, by the several tunicles and humours composing the Organ. I stay not upon instances from the impression upon the *Retina* and the due conveyance of it by the Optick nerve to the common Sensory; Nature being seldome defective in those parts unless a vitiate refraction or transmission did preceed. So to enlarge on the first, the visive rayes may be impeded in their due and orderly transit and refraction through the tunicles and humours

mours either when the same tunics and humours are preternaturally in-
crassate by the admixture or adherence
of some heterogeneous particles, or
when those tunics or humours are
altered either as to magnitude and
forme or as to consistence and texture.
For their magnitude being either pre-
ternaturally augmented or diminished
and their convexity or concavity
changed, or their consistence more
crass or more thin then they should be
naturally, the due transire of the vi-
sive rayes must necessarily be disorder'd
and consequently sight obscur'd.

Here I cannot pass with silence this
surprising and admirable structure
whereby the Power and Wisdom of
God are equally conspicuous therefore
its great ground of astonishing admir-
ation to see any especially Anatomists
so blind as not to see the so lively and
convincing Characters of Divine power,
So deeply impress'd on this Organ.
Strange! Have they eyes and see not?

Are

Are their understandings so much cultivate in other things yet barren in this? Are there Luxuriant Witts and eloquence able to expatiate so vastly in things of less moment and yet so shallow and silent here? Any thinking and considerate Christian has ground to stand amaz'd when he reflects how that God having engraven the legible Characters of his power on this Organ yet such as view it most nearly and attentively in its anatomick structure doe most overly and transiently observe the Power and Wisdom of its Author. But passing such negligent observers let us see a little what reason daring Atheists have for their Infidelity. Now for me to run over the various Phantasms and delirious Notions of speculative Atheists that have plagued the World, were no less fruitless to us as it was impious to them. I shall only touch a little the opinion of such as have seem'd to talk with more reason and seeming probability then any else that have
favoured

favoured speculative Athèism and those are such as assert the Universe and all the particular Bodies therein to be fram'd by a fortuitous concourse of preexisting Atoms; but sure if these should with the eyes of unbyass'd reason, duely consider the structure of this Organ they may blush at such vain empty and unsolide conjectures, I desire only that any of them laying aside prejudice and willful obstinacie would consider attentively the structure of this Organ the transite and various refractions the visive rays sustain through various and different Mediums before the object can reach the common sensory. But to goe on regularly if we consider that the rayes must first (passing through the Air or Water) strikeing upon the cornea and aqueous humor sustain refractions whereby they must be further collected and determined to the Center by which they are directed through the pupilla upon the Christalline in which they suffer yet a further Refraction

fraction and determination to the Center: And lastly, yet other distinct and differing refractions by passing into the vitrious, from all which and considering that the least alteration of the density or tenuity, convexity or concavity of the Humours, texture or transparency of the Tunics from what they are, would have produced a quite contrary effect and blindness instead of sight, it renders it more than evident that these have been fram'd by a most wise and powerful hand, and how unlikely is it that a casual concurrence of Atoms could have produced so curious a Machine so wonderfully framed as to cause from a great variety, yea contrariety of effects in the mediums, or means a conspiring congruity yea compleat harmony in the end, so that we may well say this is *Dignus Deo Vindice nodus*. Here I have purposely omitted some very suitable remarks that might have been made upon the *ligamenta ciliaria, pupilla, tunics*

nicles, *uvea vitria* & *cristallina* and Muscles, which last oblongate, or abbreviat the Bulb *ad nutum anime*, hence the cristalline humour can be approximate or distantiate from the *retina ad libitum* which is very material, in the business of sight. Now after this too tedious digression, I return to the 4th Verse.

Verse 4. *And the Doors shall be shut in the Streets.* Arius Montanus reads it *Et claudentur fores in platea*, others renders Doors *egressas ostia vel valvae quae in plateam spectant* (as *Piscator* has it) Doctor Smith agrees with the current of Interpreters in this, that the doors here are the Lips, but he likewise will have the Doors to signify not only the Lips, but the interior doors as he calls them, such as the upper and and lower Orifices of the Stomach, the Sphinkters of the Blader and Gall &c. the Streets according to him are the open wayes and passages of the Body by which the matter of nourishment passes without lett or molestation as the

Oseo-

Oseophagus, Intestines, ductus pancreaticus & Cholidochus, &c.

Now by *the doors being shut in the Streets*, I truly think by the Doors, the Lips may be meant, and by the Streets the *prima via*, but I encline also to think we need not be so strict as to apply it only to those, excluding all other things, it may likewise allude to the external senses, they being the Doors of external Objects, by which these have access into the inward man, and they being outward toward the Streets are said to be shut in the Streets, because though exposed to external objects, yet do not afford that free and uninterrupted access to such as formerly.

When the sound of the grinding is low. Arias Montanus renders it, *in humilitate vocis mola*, some have *sonitus mola*, the *septuagint* renders the words *in infirmitate vocis molentis*. Castalio has it *cum exili sonitu mola*. the Arabick version I think renders *Bi-Shpal ad imbecillitatem*. Others have it *propter vel per humilitatem*

litate, ob infirmitatem & propter remissionem, Piscator I think reads these words *propter depressum sonum.* Doctor Smith says, the Teeth is not meant here, but the Fermentative Grinding of the several Viscera, by which says he a Mass is brought to another consistence, and this Grinding he calls intrinsecal which is by the exaltation of some Internal Principle, or Addition of some Ferment, and so proceeds, proving this Grinding to be produced by Domestick Ferments. But since he here adduces the Viscera, I shall readily assent to that Hypothesis, but do assert this Grinding to be an effect of Muscular collision, or rather contraction and dilatation of the Muscular Viscera upon their within contain'd substances and this motion does produce the sound of the Grinding, which is low, either at approaching Death or decrept old Age, the Muscular Fibres having los'd their *contractive vis.* This appears better from what we have said above having compared the Mus-

Muscular Viscera to Grinding Machines capable of produceling comminution of substances, so I see not what need there is for *Doctor Smiths* setting his invention so much on the Rack, to produce a Chimerical Grinding by fictitious Ferments, since we see the motions of the Muscular Viscera does fully answer it. Whence you see I understand by the sound of the Grinding being low the Muscular Viscera having lost their comminatory or Grinding power among these chiefly the Stomach is to be understood which is further clear from what is said by *Munster* in his Annotations *per humilitatam vocem molentis* (says he) *intellige debilitatam vim digestionis, h, e. in intestino superiori, sic enim vocant Stomachum* which with others of the Muscular Viscera have a certain murmuring sound in their contractions and dilatations, which sound at approaching death must needs be very low.

And he shall rise at the voice of the Bird. *Arias Montanus* Reads it *Et consurget*

surget ad vocem volucris. I think *Junius & Piscator* both render (*ha-tsippor*) *avicula*. The *seventy* sense it *ad vocem passeris*, one glosses thir Words thus *minimo quoque strepitu somnus ejus obrumpitur. Excitabitur ex somno ad sonum minimi avis* sayes another, but this not agreeing so well with the ordinary deafness of the decrept state and would be a tautologie in the sense some take the immediately following Words I chuse raither to think it relates to the time of the Birds singing and so the sense will be *surget ad Gallum cantum Sen potius expectatus est ad Galli cantum.*

And all the Daughters of Musick shall be brought low. By the Daughters of Musick *Dr. Patrick* and *Dr. Fermin* understands the Organs of hearing that receive the sound, not those that make it as those of the voice do: But I judge that those Reverend Gentlemen has applyed thir Words to the Organs of hearing because the Vulgar Latine renders the Word (*Jichahu*) *obsurdescent* or made deaf

deaf, but if we look to the whole current of Interpreters we will find them apply it to the Organs of speech or voice and the Word *Jischahu* (which comes from the root *Jashah*) *humiliare* is certainly better rendered *humiliabuntur*, so I see not why the Organs of hearing should be meant here. I rather think the Organs of voice to be meant and doubtless the Chaldee paraphrase has regaird to the Organs of voice when it paraphrases the Words *remittentur labia tua a dicendo cantico*. *Arias Montanus* Reads this sentence *incurvabuntur omnes filia cantici*: Others have rendred *Jischahu* *supprimentur* *rejicientur* *respuentur* and others *submissæ erant* The Septuagint renders Daughters of *Musick* *filia carminis* or *filia cantus*. *Piscator* *hes omnes cantatrices*, *Hieromes* translation has the sentence *Et obsurdescent omnes filia carminis*. *Vatablus* (I think) *hes omnes filia vocis*. *Castallio* renders the whole sentence *Et Cassæ erunt musica puellæ* from all which I judge it will

I appear

appear that by the Daughters of Musick the Organs of voice are mean'd and these are said to be low when they are so vitiate as they cannot extend the Voice, but have a hoarse, rough, murmuring and inarticulate sound.

Verse 5. *Alse when they shall be afraid of that which is high.* Arias Montanus reads it *etiam de excelsa timebunt*, some read it *ab alto* others as Piscator, Junius & Tremellius read it *a re alta* others *excelsa timebunt* and *ab excelsa videbunt*.

And fears shall be in the way. Arias Montanus reads it *Et consternati in via*, others have the words *formidant in via*, others *pavebunt in via*, others *contritiones sive pavores subvenient eis in via*. Maldonate takes the meaning to be, he never thinks himself safe though in a high Tower and dreads a high Wall tho never so firm: but I think this chiefly regards the first sentence of the verse, and scarcely has any hint at the 2d. however Grotius more happily hits both sentences while he glosses the words

words thus, as they are giddy and afraid when high (which relates to the first) so tremble in the plain way for fear of some inequality and this regards the 2d. sentence, and doubtless *Grotius* goes closest to work here. For as its clear the Preacher in this place does proceed to give a further display of Mans Frailty, in his retireing state; So its no less evident that Giddyness Timoroulness, and Trembling are the constant and unseparable attendants of decaying nature.

The Almond Tree shall flourish. *Arias Montanus* reads it, *Et florebit Amygdalus* that is says some *caput consperegetur canitie, albescet caput sicut flores amygdali*, says another; The Ancient Hebrews as one sayes expound the word (*Shaked*) *coxa cui sciz os femoris infixum est*, which by the washing away the Flesh off the Buttocks shuts out it self and so is said to flourish: But this exposition seems not to be so genuine as the preceeding, Therefore I think by the Almond Tree thats said to flourish is to be understood

the gray hairs of old Men, that resemble the white flourishes of the Almond Tree, which hastens towards maturity as man (whose days are a hand breadth and his years as nothing) toward the Grave. To this *Castalio Piscator*, *Tremellius*, the *Septuagint*, as also the *Syriack*, *Arabick*, and *Tigurine Versions* seems rather to agree, but I stay not here though this be a fruitful feild for Criticisms.

And the Grasshopper shall be a burden. *Arias Montanus* has it & *oneri erit locusta*, some gloss it he can scarce bear the weight of a Locust or Grasshopper, *Avernarius* inclines a literal Translation of the words; the Grasshopper or Locust shall burden it self; that is, sayeth he his Gibbous back. And Dr. *Patrick* seems also for this while he sayes its a description of his stooping under the burden of Old Age, his Shoulders, Hips and Back all bouching out which is a load great enough for him, without any other. *Melanchton* Expones it, he can scarce bear himself. by some, the
word

words are render'd *impinguetur seu crassabitur locusta*, the Locust shall be made fat or thick.

Joannes Foresterus translates it, *ut in curvo incedat dorso sicut Cicada*, he is Crook-backed, as the Grasshopper, *Luther* seems also to have regard to this, when he glosses thus, an Old Man is like an Locust for his Bones stick out and his Body is shrunk up. The Seventy and vulgar Latine both (as I remember) has thir words *impinguabitur locusta*; others have *locusta onustum* se reddit the Grasshopper shall grow big or burthen some. I judge by the Grasshopper may be meant either the emaciate Body which because of some resemblance is called the Grasshopper, which yet is a burden to the Feeble Legs. Or here may be meaned the lightest, or smallest of things, will be burdensome in this retireing state,

And Desire shall fail. Arias Montanus has it, *Et dissipabit aviditas*. Others have *dissipabitur concupiscentia*, that is

says some the greatest Bodily Pleasures fail. And the Member (says others) that serves these pleasures is relaxed and Flaccid or shrinks as it may be read, the original word *ba-abijona* as it signifies *desiderium*, *appetitus*, *concupiscentia* signifies also the fruit of a shrub which the *Seventy* renders Cappers, others read instead of desire shall fail the Cappers shall shrink, the fruit of the Cappers being incentive to excite appetite and desire *De dieu* and some others gloss it thus though the Almond Tree flourish and the Locust be loadened with fatt. *Id est*, though the pleasures of the spring appear coming on apace making all things else to swell with joy, it doth not invigorate his Blood, or make it rise, to stir up his desire; Now I judge not only fleshly motions and sensual desires are meant (which may be said to fail when persons desist in their pursuing sensual and Carnal Objects) but here a dissatisfaction in the possession of and neglect of the pursuit after things

things sublunary and corporeal may be meaned. Because man goeth to his Long Home, And the Mourners goe about the Streets this being not so much the work of an Anatomist, I stay not on it, judging here the words may literally signify that is as they sound.

Verse 6. Or ever the Silver Cord be loosed &c. *Arias Montanus* renders it *donec non elongetur funis argenteus*. *Castalio* has it *antequam abrumpatur argentea Catena* what we Read loosed others Read shrunk up, contracted or removed, others again read it *rumpitur* seu *abrumpatur* vel *dissolvatur*, the *Tigurine* version renders it *subtrahatur* but the *Syriack* have it (I think) *præcidatur* *Piscator* and *Junius* have *funis argenteus* agreeing with *Montanus* by the Silver Cord some understand. all the humours of the Body which are as it were the threed of Life, the *Chaldee* paraphrase applies this Cord to the *Ligula linguæ* but the Cheif of the Hebrew Writers understand by it the Spinal Marrow,
Melanch-

Melanchton says the nerves and ligaments are here mean'd. Others understand only the outward tunicle of the nerves, *Doctor Smith* thinks both the Spinal Marrow, nerves, Ligaments filaments, tendons, may be mean'd.

Now I am of the mind this Word Cord may relate to the union betwixt Soul and Body which I judge is most fitly represented by a Cord yea and a Silver Cord, by a Cord which is an Instrument uniting and connecting distinct things a Silver Cord in regard of its value and worth, and this may be said to be loosed when Soul and Body are disunited.

But if any reject this as too remote and will have parts of the Body mean'd I crave leave to affirm The Lacteal Vessels and especially the *Thoracick Duct* may be here understood. But I presume to think this sentence has Regard rather to the disunion of Soul and Body, For the Hebrew word *Hebel* may also with litle or no variation
Read

Read Pilot or cheif Governor of a Ship, that word and Hebel, *funis* or *funiculus* being as I conceive from the same Root and cheseph which we Read Silver comes from Chasaph which signifies also Concupiscence, appetite desire and so it may Read the Pilot Determiner and Governour of desire, which how appositly it may be understood of the Soul, I leave to any judicious reader to judge and so without any considerable deviation from the scope of the Text I think the Words *Hebel Cheseph* may also Read Spiritual Governour or Spiritual Cord or Cord of the Spirit all which will fully answer our sense of the Words which is before the Soul and the Body be disunited.

Or the Golden Boul be broken &c. *Arias Montanus* hes it & *confringatur Lenticula aurea* some render that Word, broken *conquassatur*, others *conteratur*, others *defluat vel decurrit*, some Read *Gullah* (which we render Boul)
Phiala

Phiala, the Syriack hath it *Pomum* its some times rendered *Orbis*, the Vulgar Latine and Septuagint both (if I remember right) Read it *vitta aurea*, or Golden Head-Band, its generally held to be the *pia mater*, I find some old Writers have called it the Heart, others have thought the Brain to be mean'd by it, but in this variety I presume to give my sentiment, and with submission to others I incline to think here is mean'd the admirable frame and structure of the Organs in general; in and by which the Soul acteth and exereth its various Organick actions and this is most fitly represented by a Boul, it being a Body every point of whose surface is equally distant from its center: thence intimating that the inward Soul can Act equally on all its Organs. Next the structure of Organs are fitly represented by a Boul, which is *magnum in parvo* it being a Body capable of containing a greater number of Parts then any other of an equal superfice
but

but different figure; so likewise the structure of the several Organs duely considered do evince them to be much in litle hence fitly represented by a Bowl and a Golden-Bowl to show their value and worth, and this may be said to be broken when their structure and oeconomie is so marred and disturbed as they can no longer be capable of being the domicile of the immaterial Soul which disturbed OEconomy of Organs ordinarily does accompany the loosning of the Silver-Cord or disunion of Soul and Body, the Vitiate Organs being the sole secondary cause of the Soul's takeing its flight beyond Time into Eternity.

But if any shall reject this as general and strictly stand to the asserting its representing some particular part of the Body I must assigne the Brain as the most probable to be pointed at here, first in regard of its circular figure. 2dly in regaird it is the ready determiner of the Soul's actions. No
sooner

sooner the Soul determines the motion of such a Muscle but as soon this Golden-Boul determines the course of the Animal-Spirits to such a nerve that is subservient to the foresaid Muscle. And if *Cartes* (more curiously perhaps than truly) did assert the *Conarion* or *glandula pinealis* by its various natations and motions to determine the Spirits into the several nerves; Whatever truth is in that *Hypothesis* I am sure that this cannot be denyed to be the peculiar office of this Viscus since it not only makes but contains, and conveys the Animal Spirits destin'd for the several parts into their several nerves. Next I judge this will answer the various significations impos'd upon the Word *Gullah* whether as they regard its circular figure or its being a Vessel capable of containing which I could easily demonstrate at length if it were not that I decline being tedious, and this Boul may be said to be broken when having lost its action

action and use: But as I said above I chuse rather to think the Organs in general to be mean'd here and they do best answer the scope of the Text and Con-text, As I conceive; but I fear my defect of expressive and apposite Words to make known my thoughts on thir things may both render them lame and unfavoury to the more critick and curious Reader, for we doe but at best *darken Wisdom by Words without Knowledge.*

Or the pitcher be broken at the Fountain. The word *Chad*, which we render *Pitcher*, is translated by some *Cadus*, by others *Urna*, by others *Amphora*, *Lagena* &c. *Arias Montanus* reads this sentence *Et conteratur Hydria super scaturiginem*. Some Old Authors would have by the *pitcher* the vein cave only meant. *Doctor Smith* will have the Veins of the whole Body understood by it, Others will have the Bleddar being unable to retain the Urine mean'd, Others will have one of the Ventricles and

and its Auricle; Others understand by it the Gall-Bleddar, but since there is place allowed for conjecture, I presume to give my own shallow thoughts of it, and they are these, a Pitcher is a Vessel for receiving and transmitting Liquors, and for depositing the same in their appropriat Vessels and Receptracles, now this is said to be a *Pitcher broken at the Fountain*, which Pitcher I think may very appositly be interprete of the Stomach, whose figure and use does much more resemble a Pitcher than the Veins, yea or any of the other Viscera, and the *Fountain* here spoke of, may either be the Mouth and its Glands, which as a Fountain affords and sends forth plenty of Liquor and Saliva unto the Pitcher of the Stomach, or if with *Arias Montanus* we read it, *super scaturiginem*, or with the *Seventy* *super fontem*, or if with *Castalio Piscator* and *Junias* and *Tremellius* we read it *ad scatebram*, which signifies a Spring of Water, from a source or spring or a bourn,

bourn, and I judge the Lacteal Vessels and Receptacle of Chyle may be mean'd, by the *scaturigo* Spring or Source and Fountain; the Stomach, being above these locally in situation; Yea it would be no great improbability to interpret the Fountain of the Lacteals and Receptacle, because they are as it were the cannuls, by which all Fluids are first imported into the Body, and these further resemble a Fountain, thus the several Lacteals are like the many internal subterraneous Springs, uniting in the Receptacle (or Fountain or wells head) so constituting the conspicuous Stream of the Thoracick Duct, terminating by means of the Cava in the Cistern of the Heart. The *Chaldee Paraphrase* Interpret the pitcher of the Gall-Bleddar and the Fountain of the Liver, so read the Sentence *Rumpatur fell tuum super jecur tuum*, some by the Fountain understand the Heart. Doctor Smith will only have the right

ven.

ventricle of the Heart, to be mean'd by it.

Then this pitcher of the Stomach may be said to be broken when its Muscular Fibres can no more contract themselves upon the contained aliment, for its digestion.

Or the wheel broken at the cistern. Some as Montanus and the Vulgar Latine read *Confringatur*, Piscator has it *conteratur*, Tremellius *disrumpitur*, the Septuagint *convolvatur rota ad cisternam*, and Castalio has this Sentence, *conquassetur ad foveam currus*. The Syriack and Tigurine (as I remember) have that verb we translate broken, *Currat*, some render the whole Sentence *Coarctetur rota super lacum*, Arias Montanus as was just now said, reads the Sentence *Confringatur rota ad cisternam*.

By the Wheel some understand the Lungs in respiration, which is a circular motion, Melanchton will have the Cistern to be understood of the Stomach, (the word Harbor according to him signi-

signifying a profound Cavity, and by the *Wheel* he understands the *Intestines* adjoining thereunto, which are wrapt about one another, making the *Mesentery* resemble a *Wheel*, this *Grotius* seems also to have some regard unto.

Doctor Patrick seems to be of the the same mind with *Doctor Smith* in this, both of them (as I remember) asserting the great Arterie to be the *Wheel*, and the left Ventricle to be the *Cistern*, and so the breaking, or shaking in peices (as *Fosterus* reads the words) of this *Wheel* to be the ceasing of the Puls: But now I go on with all submission to give my own Explication of thir words.

By the *Wheel* I conceive the Circulation of the Blood in the Arteries and Veins of the whole Body is understood. Now the Circulation may be most fitly represented by a *Wheel*, its bearing such likeness thereto, by its swift and frequent rotations through the Body, going out by the Arteries, and coming

in by the Veins, in a circular and uninterrupted motion, and this Wheel of the Circulating Blood, may be justly said to be broken, when the Blood stagnats in all its Canales, and particularly at the Heart, which is here represented by a Cistern, and most fitly may it be so, having all the properties necessary to answer these in a Cistern, which we might evince if there were place for it.

But to shew that it were very improper to restrict the Cistern to the left Ventricle of the Heart, and the Wheel to the Aorta, (as *Doctor Smith* the Learned *Pool* and others assert) appears thus, both the Auricles and right Ventricle, are not only constituent of this Viscus (which needs not be halsted to answer the meaning of the Text,) but likewise these as well as the left Ventricle, do make up the parts and perform the Actions of the Cistern, and therefore should not be excluded from being termed parts of the Cistern.

Next

Next its no less unreasonable to restrict the Wheel to the Aorta as these Gentlemen have done ; since the circulation of the Blood is as much performed by the returning Veins as the expelling Arteries, and if the Veins were excluded here, if I may adduce such a plain and homely example, the Wheel would be but an half Wheel, and the Rotations unperfite.

Hence I conclude and positively assert the Heart and all its parts (*viz*, the Auricles Ventricles &c. constitute the Cistern in the Text, and the Blood circulating in the Arteries and Veins do make the Wheel, which is said to be broken at the Cistern, when the Blood cruddles and stagnats in the Ventricles or Vessels adjoining. I could have multiplied probabilities to enforce my Opinions, wherein I dissent in thir Verses, from the most generally Received Authors, as also I could have shown sundry Anatomical Inconsistencies that would have followed upon their
their

their gloss, but I decline being tedious, and all I have said I freely submit to the Censure of the Piously Learned. and if I have given offence to any, yea to the meanest of the little Ones in the House of God, I humbly beg pardon for it, and am willing to retract what is clearly and fully discovered to be amiss. Now this being all in this chapter that is Anatomical, I conclude wishing that this Lecture of Mortality, may be no less of Morality, to those in whose hands it shall fall, and that Men reflecting upon their being Mortal might be at least excited to be Moral.

